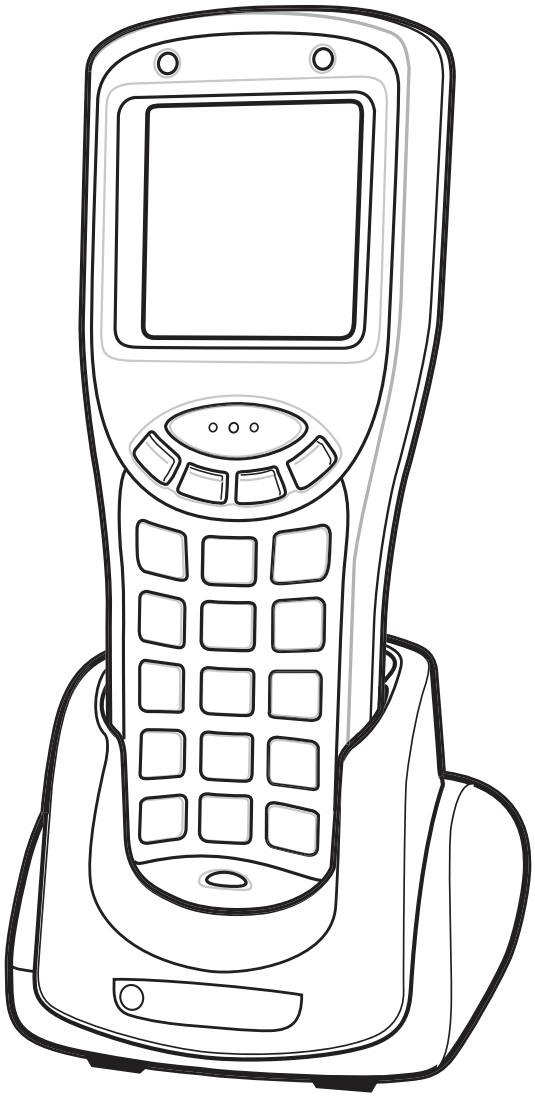
MC1000 with Windows CE 5.0

Integrator Guide



MC1000 with Windows CE 5.0

Integrator Guide

72E-87638-03

Rev. A

April 2015

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Revision History

Changes to the original manual are listed below:

-01 Rev. A	10/26/2006	Initial Release
-02 Rev. A	8/10/2007	Motorola Re-branding.
-03 Rev. A	4/2015	Zebra Re-branding

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About This Guide

Introduction

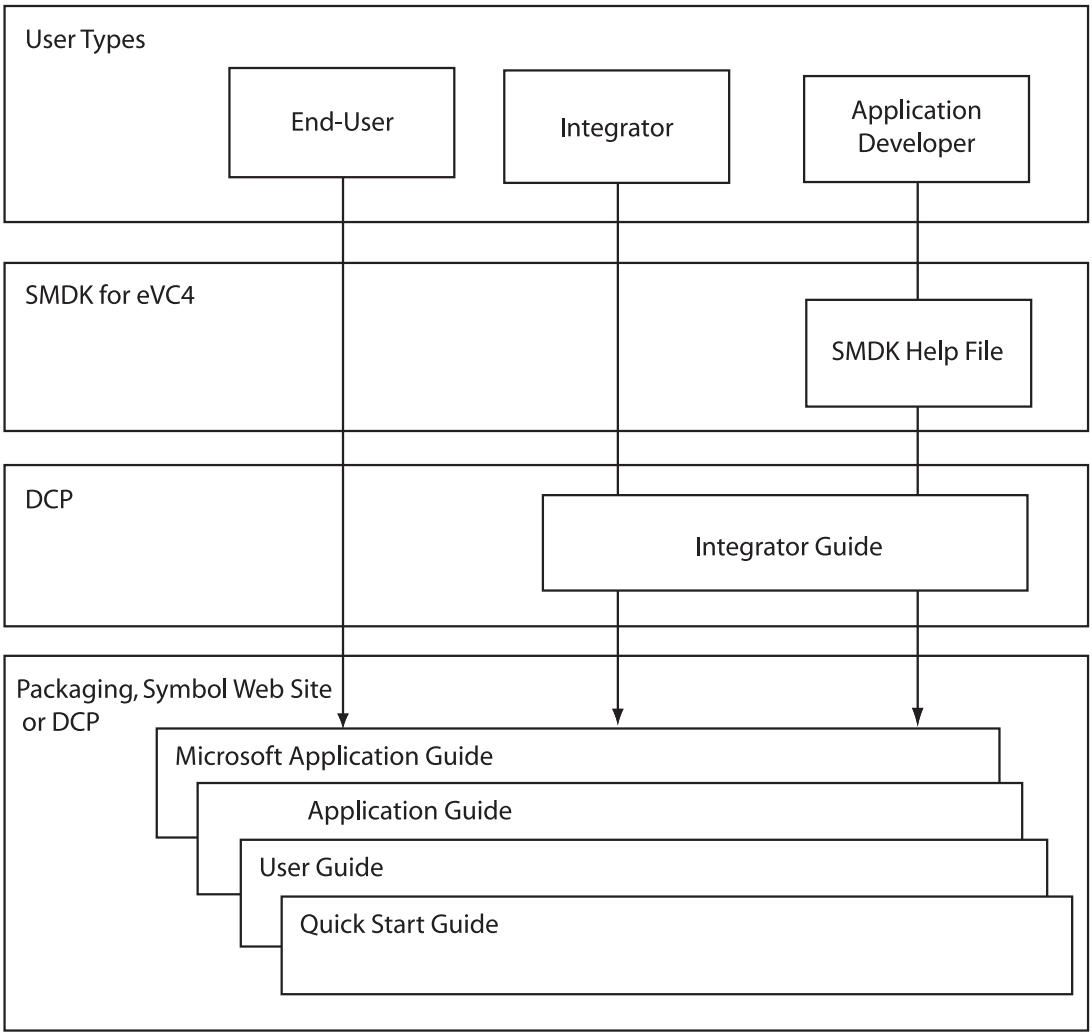
This guide provides information about setting up and configuring MC1000 mobile computers and accessories.

NOTE Screens and windows pictured in this guide are samples and can differ from actual screens.

Documentation Set

The documentation set for the MC1000 is divided into guides that provide information for specific user needs.

- **Microsoft Application Guide** - describes how to use Microsoft developed applications.
- **Application Guide** - describes how to use Zebra developed applications.
- **MC1000 with Windows CE 5.0 User Guide** - describes how to use the MC1000 mobile computer.
- **MC1000 with Windows CE 5.0 Integrator Guide** - describes how to set up the MC1000 mobile computer and the accessories.
- **SMDK Help File** - provides API information for writing applications.



Configurations

This guide covers the following configurations:

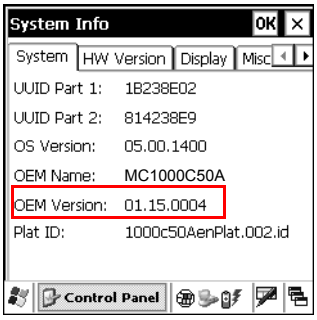
Configuration	Radios	Display	Memory	Data Capture	Operating System	Keypads
MC1000	None	Monochrome, 240 x 240 pixel, 2.2" diagonal, non-touch	32 MB RAM/ 32 MB Flash	1D laser scanner	Windows CE 5.0 Core	21 key

Software Versions

This guide covers various software configurations and references are made to operating system.

To determine the OEM software version:

Tap **Start** > **Settings** > **Control Panel** > **System Information** icon > **System** tab.



Chapter Descriptions

Topics covered in this guide are as follows:

- *Chapter 1, Getting Started*, provides information on charging the mobile computer battery and resetting.
- *Chapter 2, Accessories*, describes the accessories available for the mobile computer and how to set up power connections and battery charging capabilities, where applicable.
- *Chapter 3, ActiveSync*, provides instructions on installing ActiveSync and setting up a partnership between the mobile computer and a host computer.
- *Chapter 4, Software Installation on Development PC*, provides instructions for installing the Device Configuration Package (DCP) for MC1000 and the SMDK for eVC4 on the host computer.
- *Chapter 5, Software Installation on Mobile Computer*, provides information for downloading software and files to the mobile computer.
- *Chapter 6, Creating/Loading Hex Images*, describes how to install and use the Terminal Configuration Manager (TCM) and Initial Program Loader (IPL) to customize flash file system partitions for the mobile computer.
- *Chapter 7, AirBEAM Smart*, explains how to transfer specially-designed software packages between a host server and mobile computers.
- *Chapter 8, Maintenance and Troubleshooting*, includes instructions on cleaning and storing the mobile computer, and provides troubleshooting solutions for potential problems during mobile computer operation.
- *Appendix A, Specifications*, includes tables listing the technical specifications for the mobile computer and accessories.
- *Appendix B, Keypad Maps*, contains keypad maps for keypad configurations.
- *Appendix C, Specifications*, contains resources for designing applications for the global market.

Notational Conventions

The following conventions are used in this document:

- “Mobile computer” refers to the MC1000 terminal.

- *Italics* are used to highlight the following:
  - Chapters and sections in this and related documents
  - Dialog box, window and screen names
  - Drop-down list and list box names
  - Check box and radio button names
  - Icons on a screen.
- **Bold** text is used to highlight the following:
  - Key names on a keypad
  - Button names on a screen.
- Bullets (•) indicate:
  - Action items
  - Lists of alternatives
  - Lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents and Software

The following documents provide more information about the MC1000 mobile computers.

- *MC1000 Quick Start Guide (poster)*, p/n 72-69838-xx
- *MC1000 Licensing, Patent and Regulatory Information*, p/n 72-69838-xx
- *MC1000 with Windows CE 5.0 User Guide*, p/n 72E-87780-xx
- *Applications Guide for Zebra Devices User Guide*, p/n 72E-68901-xx
- Microsoft® Applications for Zebra Devices User Guide, p/n 72E-68197-xx
- *Microsoft® Applications for Mobile and CE 5.0 User Guide*, p/n 72E-78456-xx
- *Symbol Mobility Developer Kit (SMDK) Help File*, p/n 72E-38880-03
- *Developer Guide for Zebra Device*, p/n 72E-71161-xx
- *Symbol Mobility Developer Kits,* available at: http://developer.zebra.com
- Device Configuration Package for MC1000 (DCP for MC1000), available at: http://www.zebra.com/support
- ActiveSync software, available at: http://www.microsoft.com.

For the latest version of this guide and all guides, go to: http://www.zebra.com/support.

Service Information

If you have a problem with your equipment, contact Zebra support for your region. Contact information is available at: http://www.zebra.com/support.

When contacting support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number

Zebra responds to calls by E-mail, telephone or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Zebra Support, you may need to return your equipment for servicing and will be given specific directions. Zebra is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

If you purchased your business product from a Zebra business partner, contact that business partner for support.

Chapter 1 Getting Started

Introduction

This chapter provides information about the mobile computer, accessories, charging the mobile computer, and resetting the mobile computer.

Unpacking the Mobile Computer

Carefully remove all protective material from around the mobile computer and save the shipping container for later storage and shipping. Verify that the equipment listed below is included:

- MC1000 mobile computer
- Lithium-ion (Li-ion) battery or three AAA batteries
- Wrist strap
- Regulatory Guide
- Quick Start Guide.

Inspect the equipment for damage. If any equipment is missing or damaged, contact the Zebra support immediately. See page xiii for contact information.

Accessories

Table 1-1 lists the accessories available for the MC1000:

Table 1-1 MC1000 Accessories

Accessory	Description
Single Slot Serial/USB Cradle	Charges the mobile computer main battery and a spare battery, and synchronizes the mobile computer with a host computer through a serial or USB connection.
Four Slot USB Cradle	Charges up to four mobile computers and synchronizes the mobile computers with a host computer through a USB connection.
Power Supply	Country-specific and accessory specific power supply and line cord, plugs into the pigtail connector.
USB Client Charge Cable	Provides USB client communication capabilities and charges the mobile computer.
RS232 Charge Cable	Provides RS232 communication capabilities and charges the mobile computer.
Single Slot Cradle RS232 Cable	Provides serial host communication capabilities.
Single Slot Cradle USB Cable	Provides USB connection to a host computer.
Four Slot Cradle USB Cable	Provides internal USB hub for connection to a host computer.
Handstrap	Provides additional support when holding the mobile computer.
Li-ion Rechargeable Battery	Spare 1800 mAh battery.
Modem Module	Connects to the Single Slot Serial/USB cradle to allow the cradle to be used as a modem cradle.
Modem Cable	Connects the Modem Module to the Single Slot Serial/USB cradle.
Symbol Mobility Developer Kits	A development tool used to create native C and C++ applications for all mobile computers running the Microsoft Windows CE operating system. Available at: http://developer.zebra.com
Platform SDK	Used in conjunction with the SMDKs to create Windows CE applications for the MC1000 mobile computer. Available at: http://developer.zebra.com.

Parts

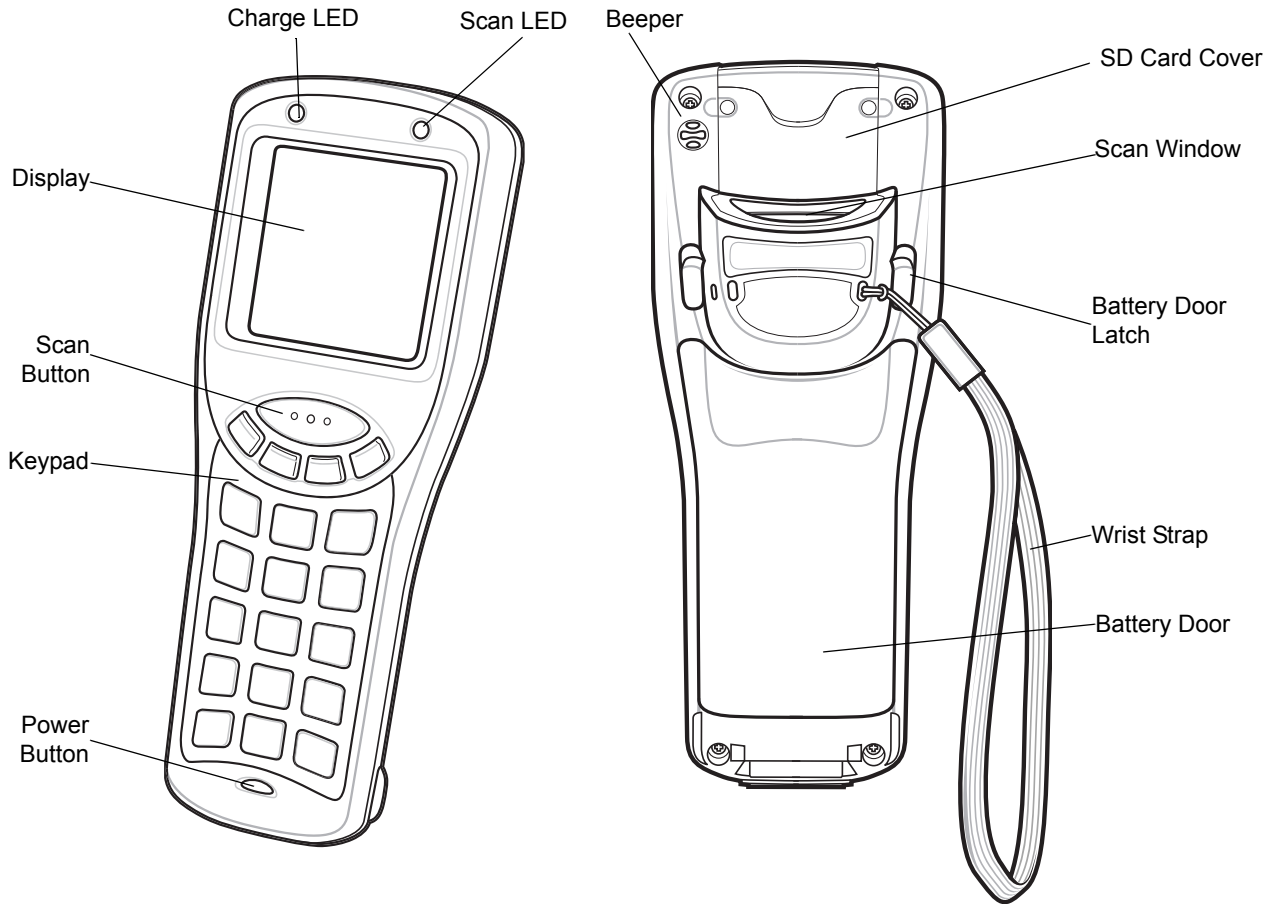


Figure 1-1 *MC1000 Mobile Computer*

Getting Started

To get the MC1000 up and running:

- install the rechargeable Li-ion battery or the optional AAA batteries
- charge the battery (rechargeable Li-ion battery only)
- start the mobile computer.

Main Battery Installation

The MC1000 uses either a rechargeable 1800 mAh Li-ion battery or three standard alkaline AAA batteries. Charge the Li-ion battery before using the mobile computer. If the Li-ion battery is not charged, see *Battery Charging on page 1-5*.

Li-ion Battery Installation

To install the Li-ion battery:

1. Pull back the two battery door latches.
2. Lift the battery door.

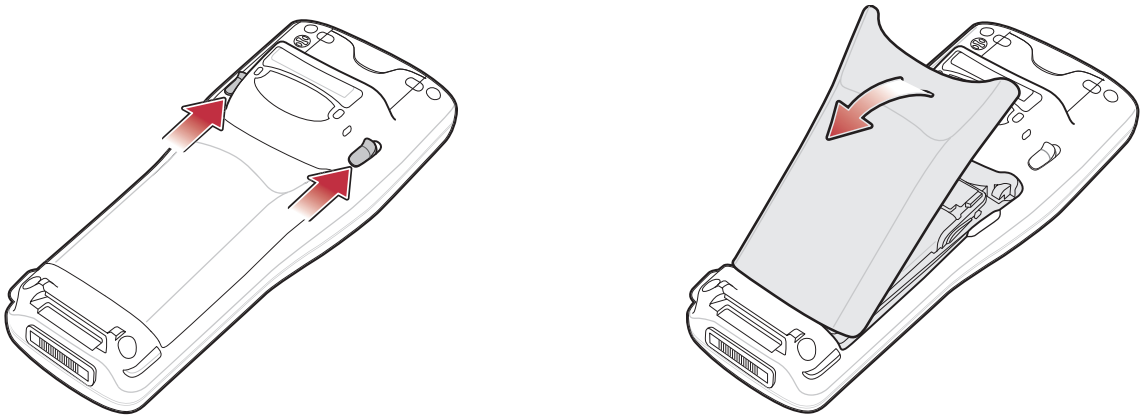


Figure 1-2 *Battery Door Removal*

CAUTION The battery door might not closed properly if the battery adapter clip is not positioned correctly. Damage to the battery adapter clip and battery door may occur.

Avoid touching the contacts when positioning the battery adapter clip.

3. With your index and middle fingers, place the battery adapter clip in the up position and push forward until it is latched in position.
4. Insert the battery into the battery well top first.

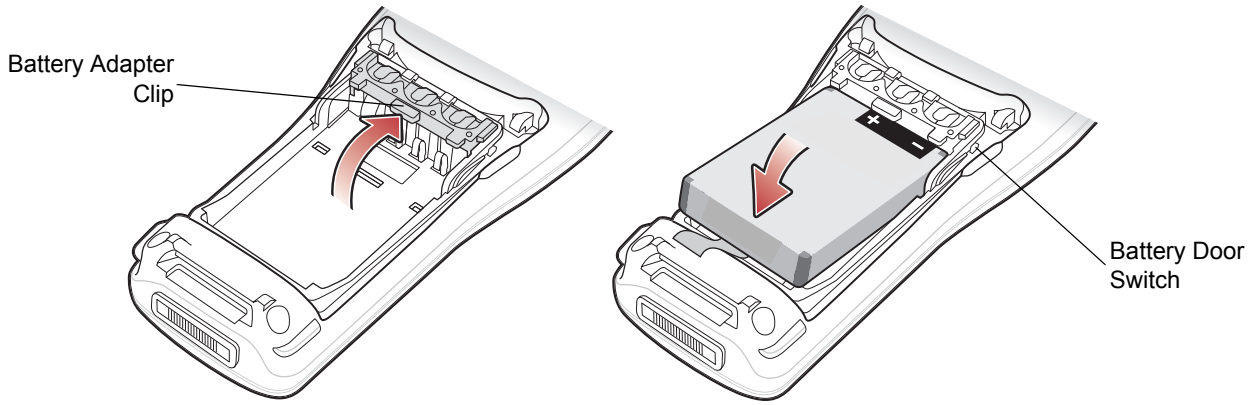


Figure 1-3 *Battery Insertion*

NOTE The battery door switch detects if the battery door is installed properly. The mobile computer will not turn on if the battery door in not in place.

5. Replace the battery door and press down until it snaps into place.

AAA Battery Installation

To install the optional AAA batteries:

1. Pull back the two battery door latches.

2. Lift the battery cover.

CAUTION The battery door might not closed properly if the battery adapter clip is not positioned correctly. Damage to the battery adapter clip and battery door may occur.

Avoid touching the contacts when positioning the battery adapter clip.

3. With your index and middle fingers holding the sides of the battery adapter clip, push toward the bottom of the mobile computer until it is latched in the down position.
4. Insert the three AAA batteries into the battery well, noting the positions of the batteries.

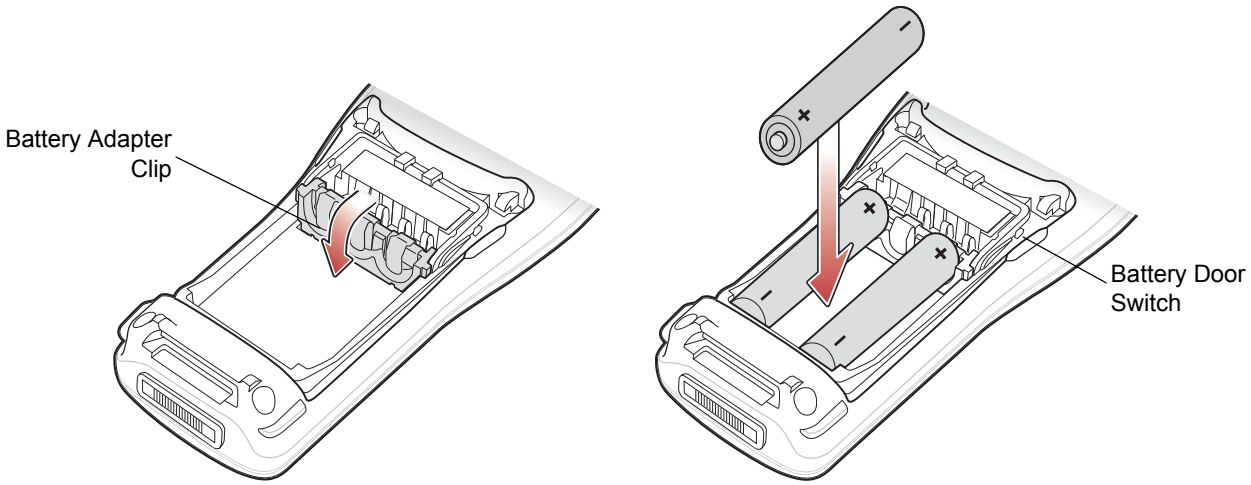


Figure 1-4 *Main AAA Battery Installation*

NOTE The battery door switch detects if the battery door is installed properly. The mobile computer will not turn on if the battery door in not in place.

5. Replace the battery door and press down until it snaps into place.

Battery Charging

NOTE Rechargeable AAA batteries cannot be recharged in the mobile computer. Refer to the rechargeable AAA battery product information for charging instructions.

Use the mobile computer's cradles, charge cables, and spare battery chargers to charge the mobile computer's main Li-ion battery.

Before using the mobile computer for the first time, fully charge the main battery until the amber Charge LED Indicator remains lit (see *Table 1-2 on page 1-6* for charge status indications). The Standard Battery fully charges in less than four hours and the Extended Life Battery fully charges in less than six hours.

The mobile computer is equipped with a memory backup battery which automatically charges from the main battery whether or not the mobile computer is operating or is in suspend mode. The memory backup battery retains data in memory for at least 30 minutes when the mobile computer's main battery is removed or fully discharged. When the mobile computer is used for the first time or after the memory backup battery has fully discharged, the memory backup battery requires approximately 15 hours to fully charge. Do not remove the main battery from the mobile computer for 15 hours to ensure that the memory backup battery fully charges. If the main battery is

removed from the mobile computer or the main battery is fully discharged, the memory backup battery completely discharges in several hours.

When the main battery reaches a very low battery state, the combination of main battery and backup battery retains data in memory for at least 72 hours.

Do not remove the main battery within the first 8 hours of use. If the main battery is removed before the backup battery is fully charged, data may be lost.

Use the following accessories to charge the Li-ion battery:

- Cradles:
  - Single Slot Serial/USB cradle
  - Four Slot USB cradle.
- Cables (and a power supply):
  - USB Charge cable
  - RS-232 Charge cable.
- Spare Battery Charger:
  - Single Slot Serial/USB cradle.

NOTE To charge the battery for your mobile device, battery and charger temperatures must be between +32° F and +104° F (0° C to +40° C).

To charge the mobile computer Li-ion and backup batteries use a cradle or a charge cable. The RS-232 charge cable requires both the charge cable and a Zebra approved power supply.

- Cradles

  Insert the mobile computer into a cradle. See *Chapter 2, Accessories* for accessory setup. The mobile computer starts to charge automatically. The Charge LED lights to indicate the charge status. See *Table 1-2* for charging indications.

- Cables

  Connect a charge cable to the appropriate power source and connect the other end of the charge cable to the mobile computer. See *Chapter 2, Accessories* for accessory setup. The mobile computer starts to charge automatically. The Charge LED lights to indicate the charge status. See *Table 1-2* for charging indications.

Table 1-2 Mobile Computer Charging LED Indicator

Status	Indication
Off	Mobile computer is not placed correctly in the cradle; charge cable is not connected correctly; charger is not powered.
Slow Blinking Amber	Mobile computer is charging.
Solid Amber	Charging is complete. Note: When the Li-ion battery is initially inserted in the mobile computer, the Charge LED flashes once if the battery power is low or the battery is not fully inserted.

Starting the Mobile Computer

When the mobile computer is powered on for the first time, it initializes. The splash screen appears for a short period of time. If the mobile computer does not power on, see *Resetting the Mobile Computer on page 1-7*.

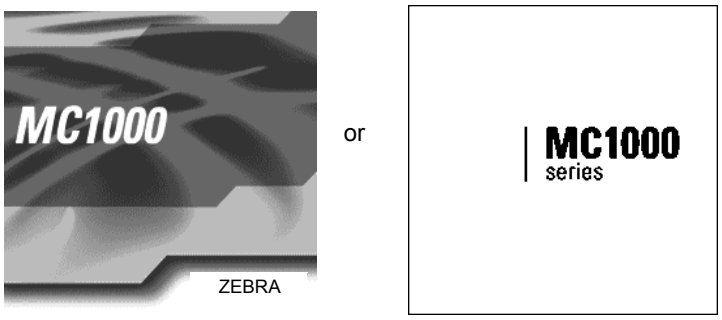


Figure 1-5 *Splash Screen*

Resetting the Mobile Computer

If the mobile computer stops responding to input, reset it. There are two types of resets, warm boot and cold boot. A warm boot restarts the mobile computer by closing all running programs. All data that is not saved is lost.

A cold boot also restarts the mobile computer, but erases all stored records and entries from RAM. In addition it returns formats, preferences, and other settings to the factory default settings.

Perform a warm boot first. This restarts the mobile computer and saves all stored records and entries. If the mobile computer still does not respond, perform a cold boot.

Performing a Warm Boot

To perform a warm boot press and hold the **Power** button until a message appears to warm boot the mobile computer. As the mobile computer initializes, the MC1000 desktop appears.

CAUTION Files that remain open during a warm boot may not be retained.

Performing a Cold Boot

A cold boot restarts the mobile computer and erases all user stored records and entries from RAM. *Never perform a cold boot unless a warm boot does not solve the problem.*

A cold boot resets the mobile computer to the default setting and removes added applications and all stored data. Do not cold boot without support desk approval.

To perform a cold boot press and hold the **Power** button for at least 15 seconds. As the mobile computer initializes its Flash File system, the splash window appears for about 15 seconds.

Waking the Mobile Computer

The wakeup condition settings define what actions wake up the mobile computer. The settings are subject to change/update.

Table 1-3 Wakeup Conditions (Default Settings)

Status	Description	Conditions for Wakeup
Power Off	When the mobile computer is set to the suspend mode by pressing the **Power** button, these actions wake the mobile computer.	**Power** button is pressed. AC power is added or removed. Cradle/cable connect or disconnect.
		Key or scan button is pressed.
		Real Time Clock set to wake up.
Auto Off	When the automatic power-off function places the mobile computer in suspend mode these actions wake the mobile computer.	**Power** button is pressed. AC power added or removed. Cradle/cable connect or disconnect.
		Key or scan button is pressed.
		Real Time Clock set to wake up.

Li-ion Battery Removal

To remove the Li-ion battery:

NOTE Pulling back the left battery door latch places the mobile computer in suspend mode.

1. Press the red **Power** button to turn off the screen and place the mobile computer in suspend mode.
2. Pull back the two battery door latches.
3. Lift the battery door.
4. Pull the battery tab up to remove the battery.

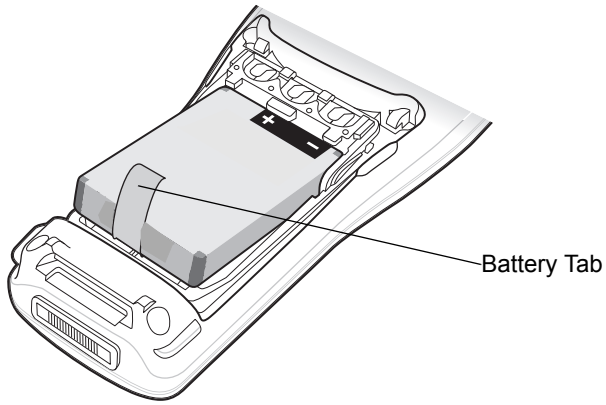


Figure 1-6 *Li-ion Battery Removal*

AAA Batteries Removal

To remove the AAA batteries:

NOTE Pulling back the left battery door latch places the mobile computer in suspend mode.

1. Press the red **Power** button to turn off the screen and place the mobile computer in suspend mode.
2. Pull back the two battery door latches.
3. Lift the battery door.
4. Remove the three AAA batteries from the mobile computer.

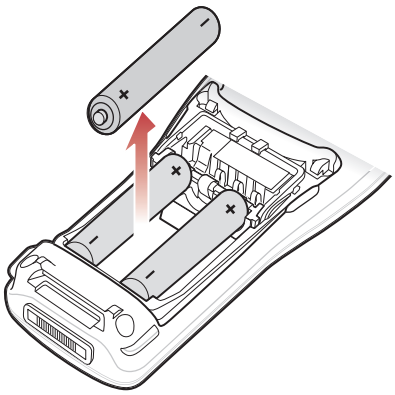


Figure 1-7 *AAA Battery Removal*

Spare Battery Charging

Use one of two accessories to charge spare Li-ion batteries. See to *Chapter 2, Accessories* for more information on spare battery charging.

SD/SDIO Card

To install an SD memory card or an SDIO card:

NOTE Zebra neither sells nor supports 3rd party SDIO products integrated into the MC1000. Zebra is not responsible for the 3rd party SDIO card in-country regulatory certification. Customers must contact directly with the selected 3rd party SDIO card vendors to ensure the vendor has obtained all the required regulatory certifications for the targeted countries.

1. Press the red **Power** button to turn off the screen and place the mobile computer in suspend mode.
2. Loosen the two captive screws securing the SD card cover.

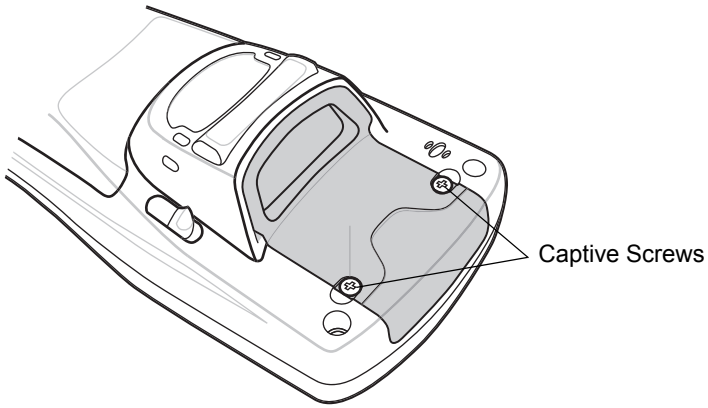


Figure 1-8 *SD Card Cover Screw Removal*

3. Remove the SD card cover.

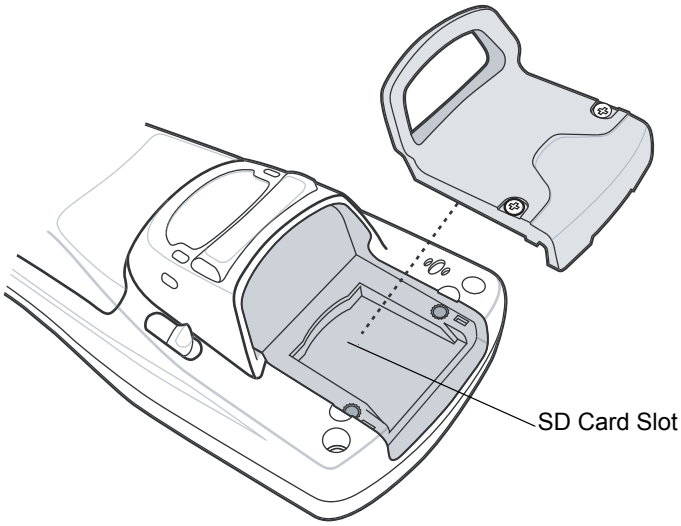


Figure 1-9 *SD Card Cover Removal*

4. Insert the SD memory card into the SD card slot. Note the position of the notch on SD card.

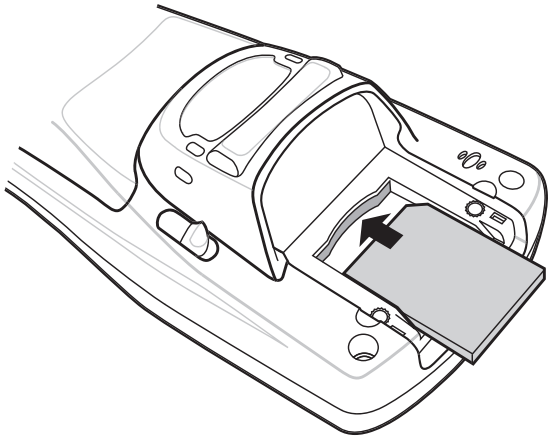


Figure 1-10 *SD Card Installation*

5. Replace the SD card cover.
6. Secure the two captive screws.

When installing an extended Secure Digital (SD) Card, you must remove a pad on the back of the SD Card cover.

1. Remove two screws securing the SD Card cover.

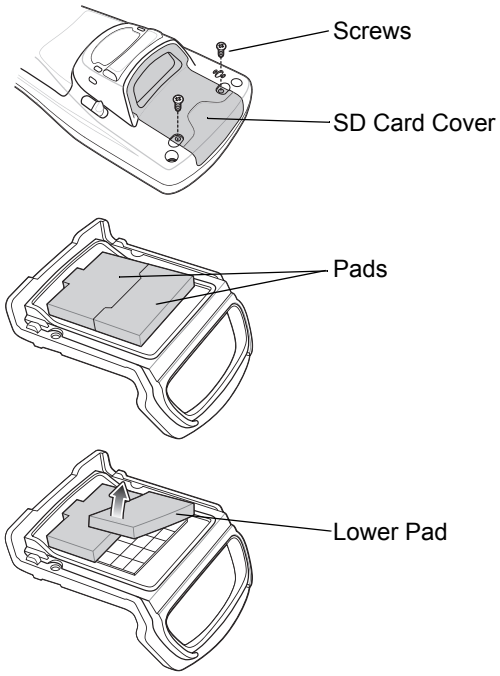


Figure 1-11 *Extended SD Card Installation*

2. Lift the SD Card cover off the mobile computer.
3. Peel the lower pad off the back of the cover.
4. Install the SD Card into the mobile computer.
5. Replace the SD Card cover onto the mobile computer and secure using the two screws.

If the SD Card cover does not have a split pad on the back of the cover, contact Zebra support. See *Service Information on page xiii* for contact information.

Wrist Strap

The wrist strap can be installed on either the right or left tether point. To install the wrist strap:

1. Thread the wrist strap loop through the tether point.

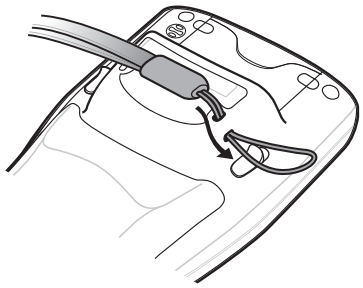


Figure 1-12 *Insert Loop into Tether Point*

2. Slip the end of the wrist strap through the loop and pull taught.

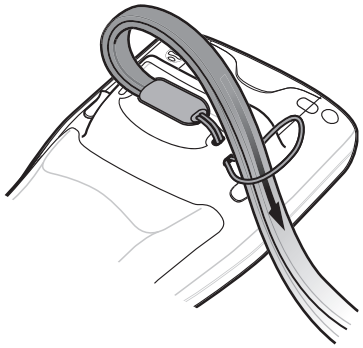


Figure 1-13 *Slip Wrist Strap Through Loop*

Handstrap

Install the optional handstrap on either the right or left tether point. To install the handstrap:

1. Insert the handstrap clip into the slot at the bottom of the mobile computer.

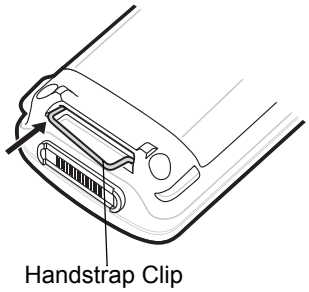


Figure 1-14 *Insert Handstrap Clip*

2. Press the mobile computer down to force the handstrap clip into place.

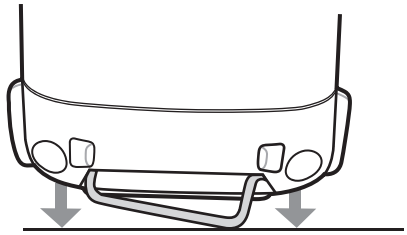


Figure 1-15 *Press Mobile Computer Down*

3. Thread the handstrap loop through the tether point.

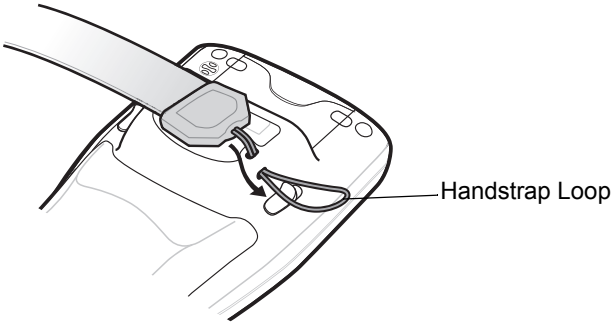


Figure 1-16 *Insert Loop into Tether Point*

4. Slip the Velcro end of the handstrap through the loop and pull taught.

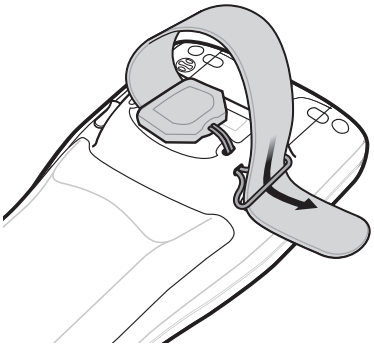


Figure 1-17 *Slip End Through Loop*

5. Slide the Velcro end through the clip.

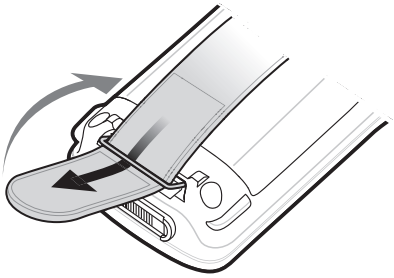


Figure 1-18 *Slide Handstrap through Clip*

Chapter 2 Accessories

Introduction

MC1000 accessories provide a variety of product support capabilities. Accessories include cradles and cables.

Cradles

- Single Slot Serial/USB cradle charges the mobile computer Li-ion battery and/or a spare battery. It also synchronizes the mobile computer with a host computer through either a serial or a USB connection.
- Four Slot USB cradle charges up to four mobile computers. It also synchronizes up to four mobile computers with a host computer through a USB connection.

Cables

The cables snap on to the mobile computer and are used to connect external devices to the mobile computer.

- USB Charge Cable
- RS-232 Charge Cable.

Single Slot Serial/USB Cradle

This section provides information and setup instructions for the Single Slot Serial/USB Cradle.

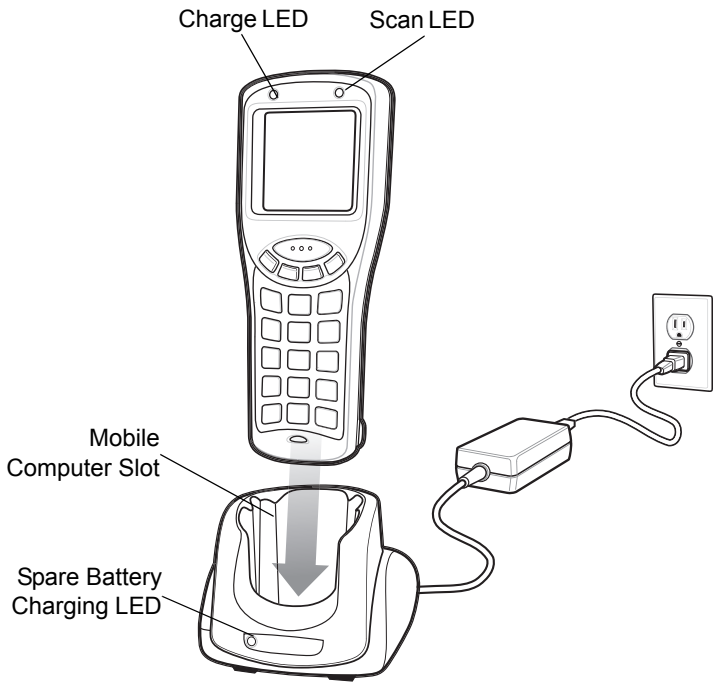


Figure 2-1 Single Slot Serial/USB Cradle

NOTE Use only a Zebra-approved power supply output rated 5.4 VDC and minimum 3A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine Zebra genehmigt in den Ausgabe: 5.4 VDC und minimum 3A. Die Stromversorgung ist bescheinigt nach EN60950 mit SELV Ausgaben. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

The Single Slot Serial/USB cradle:

- Provides 5.4VDC power for operating the mobile computer.
- Provides a serial port and USB port (mini B receptacle) for data communication between the mobile computer and a host computer.
- Synchronizes information between the mobile computer and a host computer (with customized or third party software, it can also synchronize the mobile computer with corporate databases).
- Provides serial connection through the serial pass-through port for communication with a serial device, such as a host computer (cradle serial communication cable is available). For communication setup procedures, see *Communication on page 2-13*.
- Provides USB connection through the USB pass-through port for communication with a USB device, such as a host computer (cradle USB communication cable is available). For communication setup procedures, see *Communication on page 2-13*.
- Charges the mobile computer's Li-ion battery.
- Charges a spare Li-ion battery.

Setup

Figure 2-2 illustrates connecting the cradle to an RS-232 port and *Figure 2-3* illustrates connecting the cradle to a USB port. After setting up the Single Slot Serial/USB cradle, see *Communication on page 2-13* for information on setting up the mobile computer for communication with a host device.

NOTE The cradle requires a dedicated port on the host computer. Select either serial or USB for communications, do not connect the cradle to both serial and USB ports.

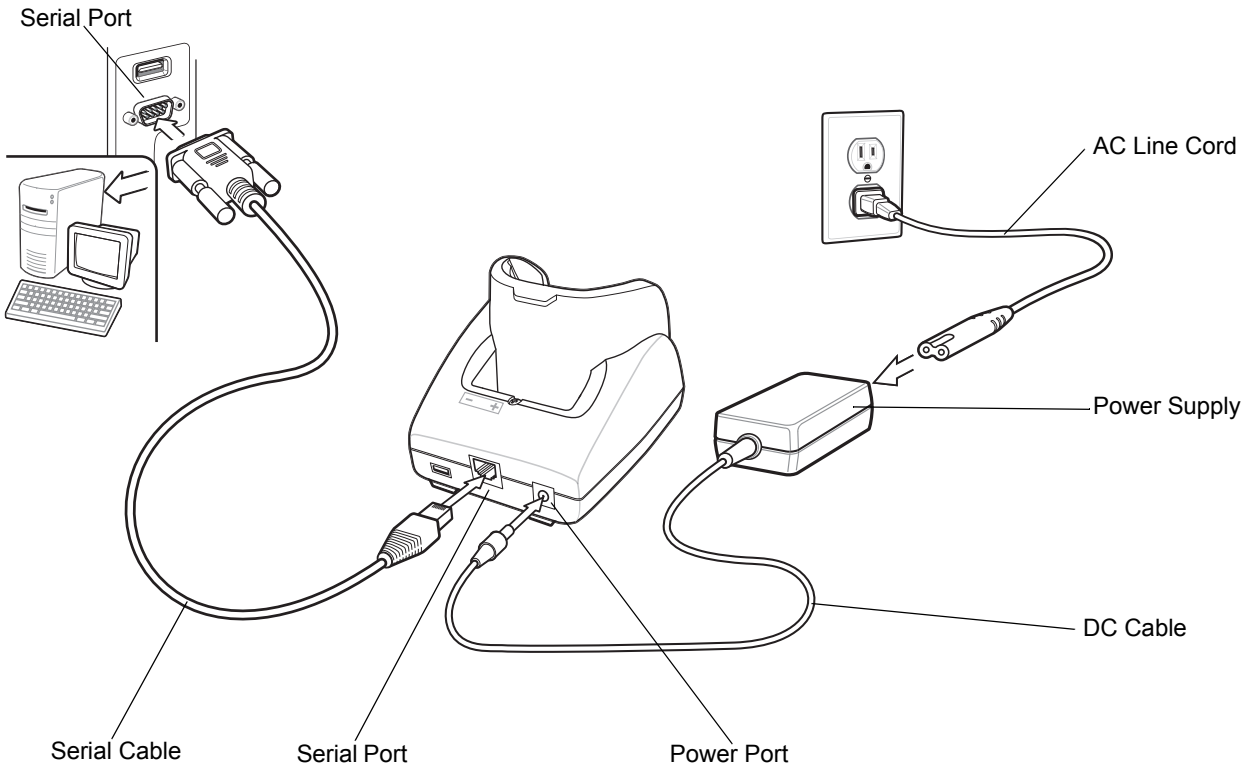


Figure 2-2 Single Slot Serial/USB Cradle - Serial Setup

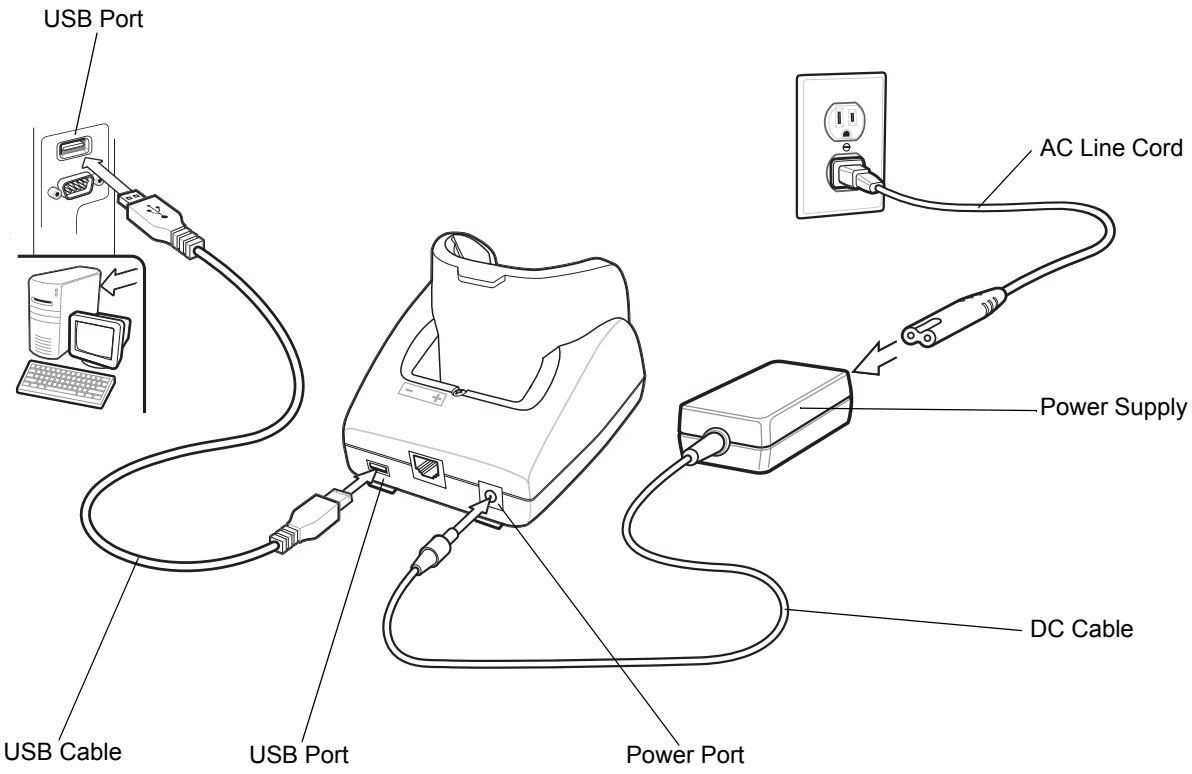


Figure 2-3 Single Slot Serial/USB Cradle - USB Setup

Battery Charging

The Single Slot Serial/USB cradle can charge the mobile computer's Li-ion battery and a spare Li-ion battery simultaneously.

NOTE Re-chargeable AAA batteries do not charge in the mobile computer when the mobile computer is placed in the Single Slot Serial/USB cradle.

To charge the battery for your mobile device, battery and charger temperatures must be between +32° F and +104° F (0° C to +40° C).

To charge the mobile computer:

1. Connect the Single Slot Serial/USB cradle to a power source.
2. Firmly press the mobile computer into the mobile computer slot. The mobile computer's Charge LED indicates the mobile computer battery charging status.
3. When charging is completed, hold the cradle with one hand and lift the mobile computer out of the cradle with the other hand.

To charge the spare Li-ion battery:

1. Connect the Single Slot Serial/USB cradle to a power source.
2. Align the battery contacts as shown on the cradle. Note the polarity icon on the battery.
3. Insert the Li-ion battery into the battery slot noting the battery polarity.

4. Gently press down on the battery to ensure proper contact.

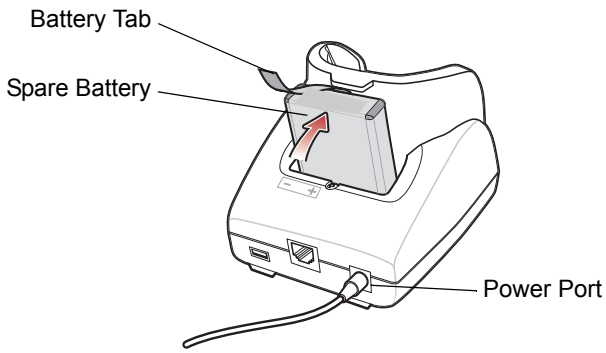


Figure 2-4 Inserting the Spare Li-ion Battery into the Cradle

The cradle Spare Battery Charge LED indicates the spare battery charging status. See *Table 2-1* for charging status indications.

To remove the battery, pull the battery tab away from the mobile computer slot and lift the battery out of the slot.

The Li-ion battery charges in less than four hours.

Table 2-1 LED Charging Status Indicators

LED	Indication
Mobile Computer Charging (LED on mobile computer)	
Off	Mobile computer not in cradle; mobile computer not placed correctly; cradle is not powered, or environment is outside the battery charging temperature range.
Slow Blinking Amber	Mobile computer is charging.
Solid Amber	Charging complete.
Off	No spare battery in slot; spare battery not placed correctly; cradle is not powered, or environment is outside the battery charging temperature range.
Slow Blinking Amber	Spare battery is charging.
Solid Amber	Charging complete.

Four Slot USB Cradle

This section describes how to set up and use the Four Slot USB Cradle with the mobile computer.

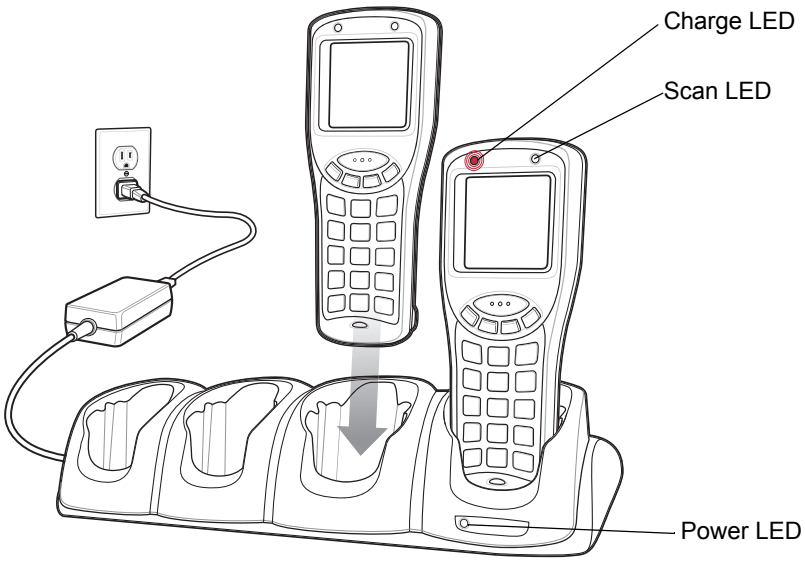


Figure 2-5 Four Slot Charge Only Cradle

NOTE Use only a Zebra-approved power supply output rated 12 VDC and minimum 3A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine Zebra genehmigt in den Ausgabe: 12 VDC und minimum 3A. Die Stromversorgung ist bescheinigt nach EN60950 mit SELV Ausgaben. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

The Four Slot USB Cradle:

- Provides 5.4 VDC power for operating the mobile computer.
- Simultaneously charges up to four mobile computers.

Setup

Connect the Four Slot USB cradle to a power source using the Zebra approved power supply. After setting up the Four Slot USB cradle, see *Communication on page 2-13* for information on setting up the mobile computer for communication with a host device.

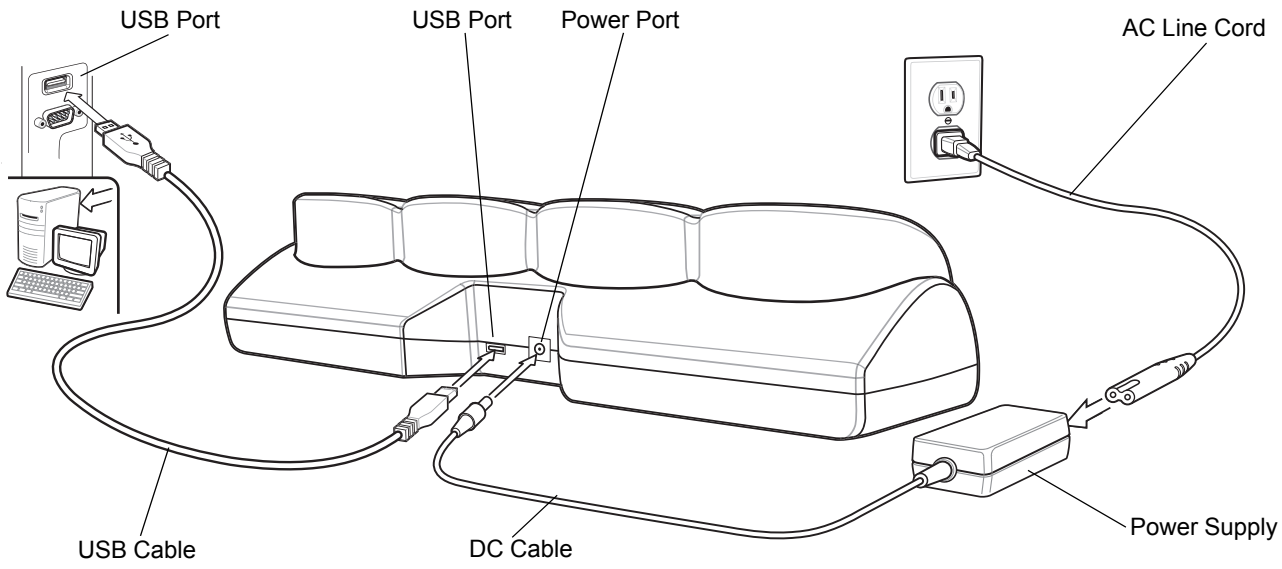


Figure 2-6 Four Slot USB Cradle Setup

Battery Charging

The Four Slot USB cradle can charge up to four mobile computers simultaneously.

NOTE Re-chargeable AAA batteries do not charge in the mobile computer when the mobile computer is placed in the Four Slot USB cradle.

To charge the battery for your mobile device, battery and charger temperatures must be between +32° F and +104° F (0° C to +40° C).

UConnect software must be loaded onto the mobile computer for proper ActiveSync operation. Refer to the *MC1000 Integrator Guide* for installing *UConnect* onto the mobile computer.

To charge the mobile computer:

1. Connect the Four Slot USB cradle to a power source.
2. Firmly press the mobile computer into the mobile computer slot.
3. The mobile computer's Charge LED indicates the mobile computer battery charging status.
4. When charging is completed, hold the cradle with one hand and lift the mobile computer out of the cradle with the other hand.

The Li-ion battery usually charges in less than four hours.

Four Slot Ethernet Cradle

This section describes how to set up and use a Four Slot Ethernet cradle with the mobile computer.

The Four Slot Ethernet cradle:

- Provides 5.4 VDC power for operating the mobile computer.
- Connects the mobile computer (up to four) to an Ethernet network.
- Simultaneously charges up to four mobile computers (with batteries installed).

You cannot ActiveSync using the Four Slot Ethernet cradle. To ActiveSync with a host computer, use the SIngle Slot Serial/USB cradle.

CAUTION Use only a Zebra approved power supply output rated 12 VDC and minimum 9 A. Use of an alternative power supply will void the product warranty and may cause product damage. See the MC1000 User Guide for the power supply regulatory compliance statement.

Setup

Connect the Ethernet cradle (Ethernet port 1) to an Ethernet hub or a port on the host device. Connect the Ethernet cradle (power port) to a Zebra approved power supply.

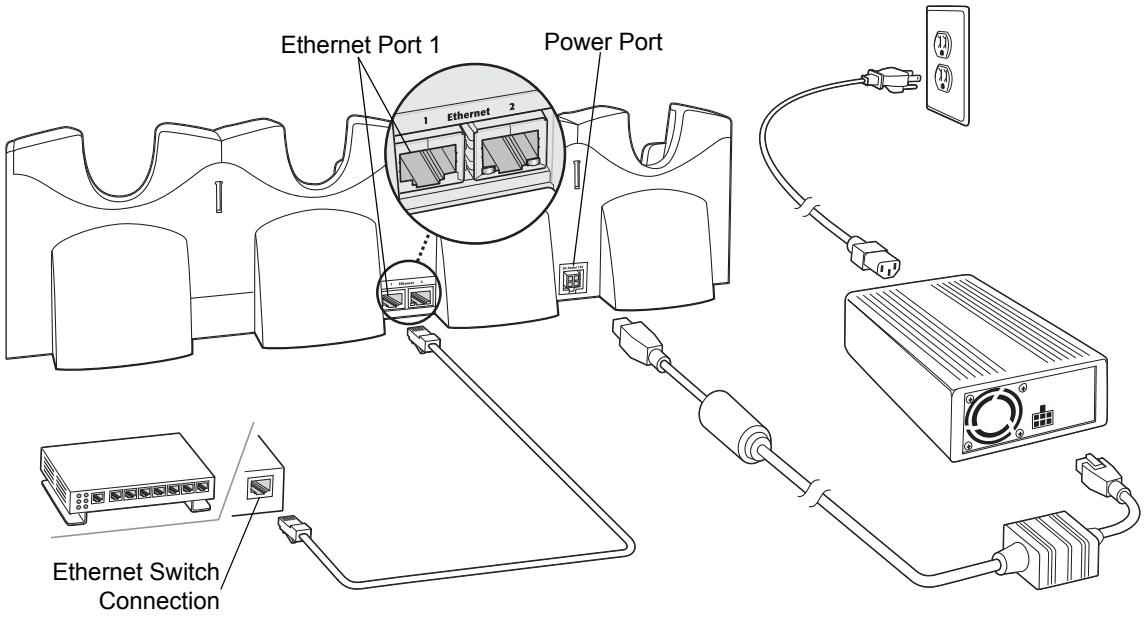


Figure 2-7 Four Slot Ethernet Cradle Connection

Speed LED

The green Speed LED lights to indicate that the transfer rate is 100 Mbps. When it is not lit it indicates that the transfer rate is 10Mbps.

Link LED

The yellow Link LED blinks to indicate activity, or stays lit to indicate that a link is established. When it is not lit it indicates that there is no link.

Daisychaining Ethernet Cradles

To connect several cradles to an Ethernet network, up to four (recommended maximum) Ethernet cradles may be daisychained. The Speed LED and the Link LED on the Ethernet port 2 function in the same way as the Speed LED and the Link LED on the front of the cradle.

To daisychain cradles:

1. Connect the first Ethernet cradle to power and to the Ethernet Switch as shown on *Figure 2-7 on page 2-8*.
2. Connect power to the second Ethernet cradle.
3. Connect the daisychain Ethernet cable (either straight or twisted cable can be used) between Ethernet Port 2 of the first cradle, and Ethernet Port 1 of the second cradle.
4. Connect additional cradles as described in Step 2 and Step 3. See *Table 2-2* for bandwidth limitations.

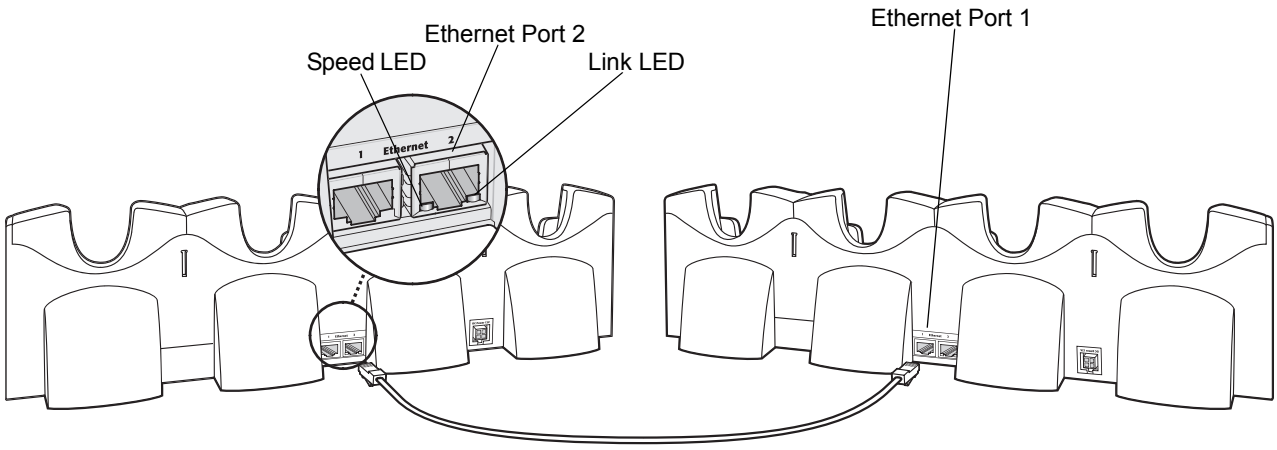


Figure 2-8 Daisychaining Four Slot Ethernet Cradles

Bandwidth Considerations when Daisychaining

Each cradle added to the daisychain impacts the bandwidth allocated to each of the inserted mobile computers, particularly when the mobile computers attempt to send and receive at data rates that exceed the bandwidth provided to the chain (typically 100 Mbps). If a mobile computer in a daisychained cradle does not use its bandwidth, that bandwidth is available to other inserted mobile computers.

Table 2-2 shows allocated bandwidth (based on 100 Mbps) for the number of daisychained cradles, with each mobile computer attempting transmission at the maximum data rate.

Table 2-2 Daisychaining Bandwidth

Daisychained Ethernet Cradles	Bandwidth Allocation For Each Ethernet Cradle (bits/sec)	Bandwidth Allocation For Each Mobile Computer (bits/sec)
Cradle 1	100,000,000	20,000,000*
Cradle 2	20,000,000	4,000,000
Cradle 3	4,000,000	800,000
Cradle 4	800,000	160,000
Cradle 5**	160,000	32,000
Cradle 6**	32,000	6,400
Cradle 7**	6,400	1,280

* The maximum bandwidth capacity for the mobile computer is 12,000,000 bits/sec.
** Depending on the application, allocated bandwidth may not be adequate.

Ethernet Cradle Drivers

The Ethernet cradle drivers are pre-installed on the MC1000. The MC1000 must be placed into USB Host mode before it is placed in a properly connected Four Slot Ethernet cradle.

1. Press **F** - **CTRL** - **F** - **ESC** to launch the Start menu.
2. Use the scroll keys to select *Settings* - *Control Panel*.
3. Press **ENT**.
4. Use the scroll keys to select the *USBConfig* icon.
5. Press **ENT**. The *USBConfig Settings* window appears.
6. Press **F** - **TAB** to select the *Port Mode*.
7. Use the scroll key to highlight *USB Host Mode*.
8. Press **ENT**.

When the mobile computer is inserted into the Four Slot Ethernet cradle, the LAN icon indicates that the mobile computer is connected to a network.

Use the mouse cursor and double-tap the LAN icon to open the LANNDS1 window. This window displays the TCP/IP information for the mobile computer.

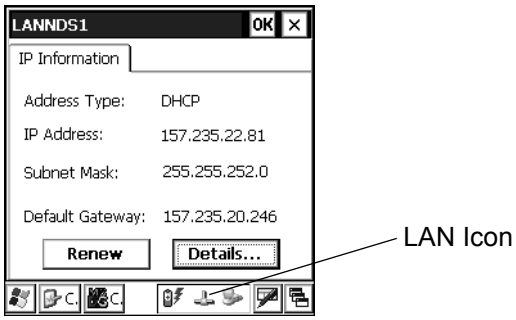


Figure 2-9 LANNDS1 Window

After using the Ethernet cradle the MC1000 must be placed in USB Client mode if ActiveSync is required.

1. Press **F** - **CTRL** - **F** - **ESC** to launch the Start menu.
2. Use the scroll keys to select *Settings* - *Control Panel*.
3. Press **ENT**.
4. Use the scroll keys to select the *USBConfig* icon.
5. Press **ENT**.
6. Press **F** - **TAB** to select the *Port Mode*.
7. Use the scroll key to highlight *USB Client Mode*.
8. Press **ENT**.

Cables

This section describes how to set up and use the cables.

NOTE Use only a Zebra-approved power supply output rated 5.4 VDC and minimum 3A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine Zebra genehmigt in den Ausgabe: 5.4 VDC und minimum 3A. Die Stromversorgung ist bescheinigt nach EN60950 mit SELV Ausgaben. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

The cables:

- provide the mobile computer's operating power and battery charging power when used with the Zebra approved power supply.
- provide serial connection through the serial pass-through port for communication with a serial device, such as a host computer. For communication setup procedures, see *Serial Connection Setup on page 2-13*.
- provide USB connection through the USB pass-through port for communication with a USB device, such as a host computer. For communication setup procedures, see *USB Connection Setup on page 2-15*.
- provide printing capabilities to an approved printer.

Setup

Connect the cable to the mobile computer. After setting up a cable, see *Communication on page 2-13* for information on setting up the mobile computer for communication with a host device.

1. Slide the bottom of the mobile computer into the cable cup and gently press it down until it is firmly seated in the cable cup.

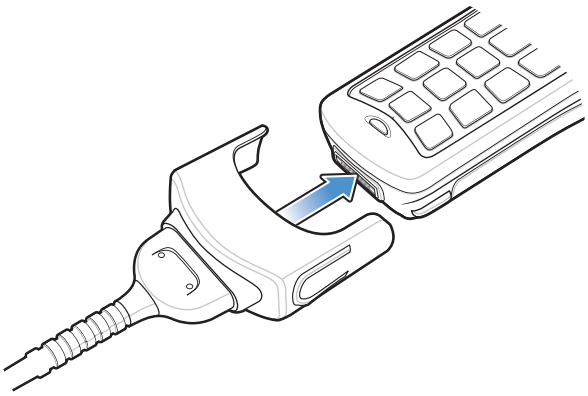


Figure 2-10 Cable Connection

2. Connect the other end of the cable to the appropriate host device.
3. For the RS-232 Serial Charge cable, connect the power supply.

Battery Charging

NOTE To charge the battery for your mobile device, battery and charger temperatures must be between +32° F and +104° F (0° C to +40° C).

The Serial Charge cable and the USB Charge cable can charge the mobile computer's Li-ion battery. Connect the cables as described above. The mobile computer's Charge LED blinks amber to indicate that the battery is charging and turns solid amber when the battery is completely charged. The Li-ion battery usually charges in less than four hours. See *Table 2-1 on page 2-5* for charging indication information.

Communication

Accessories serve as essential data communication devices, enabling the information to be synchronized on the mobile computer with the information on the host device using ActiveSync. The mobile computer can establish communication via serial connection and USB connection with the appropriate software and accessories.

Using one of the following accessories:

- Single Slot Serial/USB cradle
- Four Slot USB cradle
- RS-232 or USB Charging cables.

This section provides information on installing the communication software and setting up the appropriate accessory to enable communication between the mobile computer and the host device.

For serial communications using the Single Slot Serial/USB cradle, connect only the serial cable, do not connect both the serial cable and the USB cable. If both serial and USB communication cables are required, disable the host computer USB port in ActiveSync before enabling serial communications.

Installing Communication Software

To successfully communicate with the host device install Microsoft Activesync (version 3.7 or higher) on the host computer. See *Chapter 3, ActiveSync* for ActiveSync installation procedures.

Serial Connection Setup

1. On the mobile computer press **F** - **CTRL** - **F** - **ESC** to open the *Start* Menu.
2. Scroll up to *Settings* and press **ENT**. The *Control Panel* appears.
3. Scroll to the *PC Connections* icon and press **ENT**. The *PC Connection* window appears.

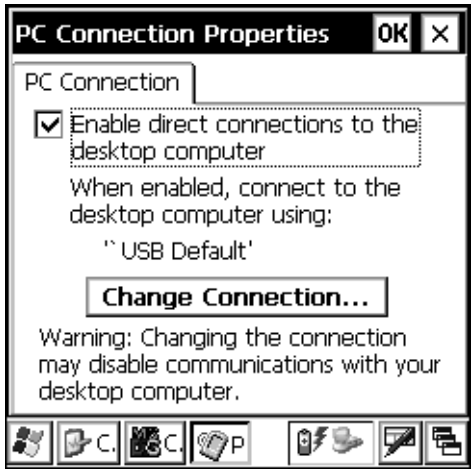

PC Connection Properties
OK
PC Connection
Enable direct connections to the desktop computer
When enabled, connect to the desktop computer using:
'' USB Default'
Change Connection...
Warning: Changing the connection may disable communications with your desktop computer.

Figure 2-11 PC Connection Window

4. Press **F** - **TAB** to highlight on the **Change Connection...** button.
5. Press **ENT**. The *Change Connection* window appears.

Figure 2-12 Change Connection Window

6. Use the scroll up and down keys to select: *Serial 3 115200.*
7. Press **ENT**.
8. Press **F** - **TAB**.
9. Press **ENT** to exit the *PC Connection* window and **ENT** to exit the *Control Panel* window.
10. Ensure that ActiveSync is installed on the host computer and a partnership is established. See *Setting Up an ActiveSync Connection on the Host Computer on page 3-2*.
11. Start ActiveSync if it is not running on the host computer. To start, select *Start* - *Programs* - *Microsoft ActiveSync*.

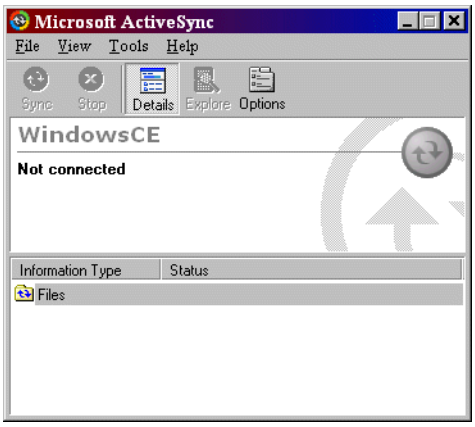


Figure 2-13 ActiveSync - Not Connected

12. In the *ActiveSync* window, select *File - Connection Settings* and ensure the selections shown in *Figure 2-14* are made. (Select the appropriate COM port for the host computer.)

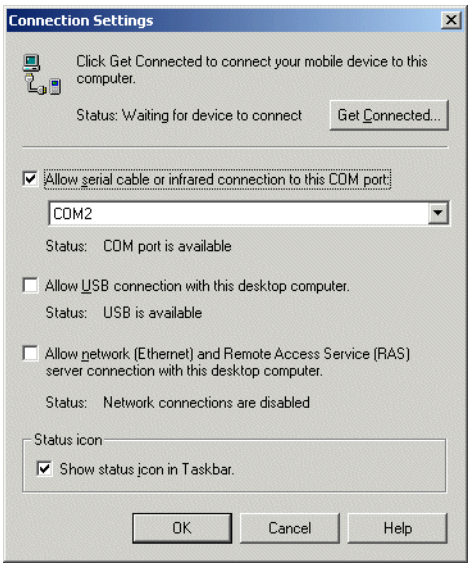

Connection Settings
Click Get Connected to connect your mobile device to this computer.
Status: Waiting for device to connect
Get Connected...
Allow serial cable or infrared connection to this COM port:
COM2
Status: COM port is available
Allow USB connection with this desktop computer.
Status: USB is available
Allow network (Ethernet) and Remote Access Service (RAS) server connection with this desktop computer.
Status: Network connections are disabled
Status icon
Show status icon in Taskbar.
OK
Cancel
Help

Figure 2-14 Serial Connection Settings

13. Click **OK** to save any changes made.

NOTE Assign each mobile computer a unique device name. Never try to synchronize more than one mobile computer to the same name.

14. Connect the mobile computer to the host computer. See *Figure 2-2 on page 2-3* to set up a Single Slot Serial/USB cradle, or see *Figure 2-10 on page 2-12* to set up a cable.

NOTE The cradle requires a dedicated port. It cannot share a port with an internal modem or other device. Refer to the computer user manual to locate the serial port(s).

15. Upon connection, synchronization occurs automatically.

USB Connection Setup

1. On the mobile computer press **F - CTRL** - **F**- **ESC** to open the *Start* menu.

2. Scroll up to *Settings* and press **ENT**. The *Control Panel* appears.
3. Scroll to the *PC Connections* icon and press **ENT**. The *PC Connection* window appears.

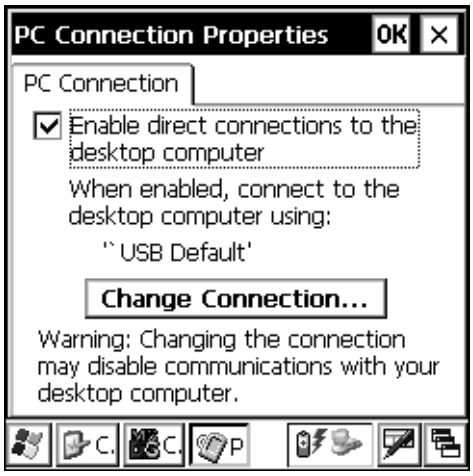

PC Connection Properties
OK
PC Connection
Enable direct connections to the desktop computer
When enabled, connect to the desktop computer using:
'' USB Default'
Change Connection...
Warning: Changing the connection may disable communications with your desktop computer.

Figure 2-15 PC Connection Window

4. Press **TAB** to highlight on the **Change Connection...** button.
5. Press **ENT**. The *Change Connection* window appears.

Figure 2-16 Change Connection Window

6. Use the scroll up or down keys to select: *USB Default.*
7. Press **ENT** to exit the *Change Connection* window.
8. Press **F** - **TAB**.
9. Press **ENT** to exit the *PC Connection* window and **ENT** to exit the *Control Panel* window.
10. Ensure that ActiveSync is installed on the host computer and a partnership is established, see *Setting Up an ActiveSync Connection on the Host Computer on page 3-2*.
11. Start ActiveSync if it is not running on the host computer. To start, select *Start* > *Programs* > *Microsoft ActiveSync*.

Figure 2-17 ActiveSync - Not Connected

12. In the *ActiveSync* window, select *File* > *Connection Settings* and ensure the selections shown in *Figure 2-18* are made.

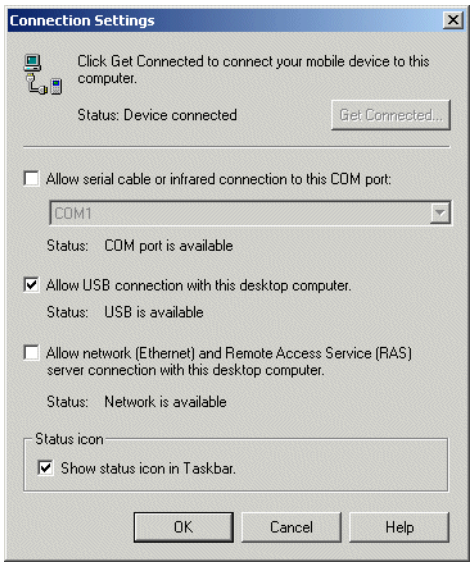

Connection Settings
Click Get Connected to connect your mobile device to this computer.
Status: Device connected
Get Connected...
Allow serial cable or infrared connection to this COM port:
COM1
Status: COM port is available
Allow USB connection with this desktop computer.
Status: USB is available
Allow network (Ethernet) and Remote Access Service (RAS) server connection with this desktop computer.
Status: Network is available
Status icon
Show status icon in Taskbar.
OK
Cancel
Help

Figure 2-18 USB Connection Settings

13. Click **OK** to save any changes made.

NOTE Assign each mobile computer a unique device name. Never try to synchronize more than one mobile computer to the same name.

14. Connect the mobile computer to the host computer. See *Figure 2-2 on page 2-3* to set up a Single Slot Serial/USB Cradle, or see *Figure 2-10 on page 2-12* to set up a cable.

NOTE The cradle requires a dedicated port. It cannot share a USB port with any other device. Refer to the computer user manual to locate the USB port(s).

15. Upon connection, synchronization occurs automatically.

UConnect

UConnect software enables automatic synchronization of every mobile computer inserted in the Four-Slot USB cradle.

Installing UConnect

To install *UConnect* via the .CAB file:

1. Download the UConnect .CAB file from the Support Central website, http://www.zebra.com/support, to the host computer.
2. Copy the file from the host computer to the mobile computer. See *Downloading Files Using ActiveSync on page 5-3*.
3. On the mobile computer, navigate to the .CAB file and run the file.
4. Follow the screen prompts to install.

With this method, the .CAB file does not install the .cpy and .reg files.

Once installed, *UConnect* launches automatically upon mobile computer startup. Each mobile computer must first form an ActiveSync partnership with a host computer for *UConnect* to successfully manage synchronization.

Configuring UConnect

To customize default settings for *UConnect*, create a .reg file that overrides UConnect's initial default settings. Refer to UConnect.reg, included with *UConnect*, for information on setting custom hard reset and default settings.

To customize *UConnect* temporarily (until the next hard reset):

1. Switch to the UConnect application.
2. Using the keypad, navigate to *Settings*.

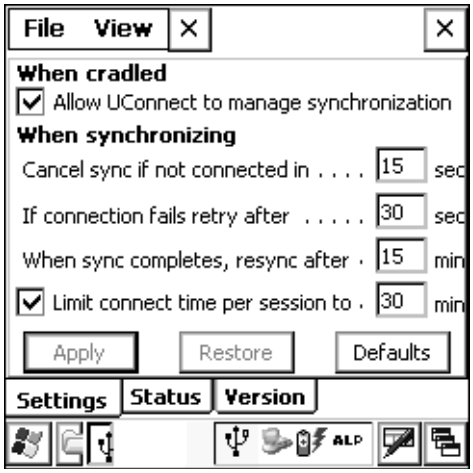

File View
When cradled
Allow UConnect to manage synchronization
When synchronizing
Cancel sync if not connected in . . . . 15 sec
If connection fails retry after . . . . . 30 sec
When sync completes, resync after . 15 min
Limit connect time per session to . 30 min
Apply
Restore
Defaults
Settings
Status
Version

Figure 2-19 UConnect Settings Window

3. Select the *Allow UConnect to manage synchronization* check box to allow *UConnect* to control docking events and schedule synchronization sessions. *UConnect* launches ActiveSync when a mobile computer is inserted in the cradle to synchronize the mobile computer and the host computer. If another inserted mobile computer is synchronizing, *UConnect* reschedules synchronization based on the connection retry interval setting.

Deselect this check box to restore control of cradle events to ActiveSync. This may be necessary when temporarily connecting to a non-partnered host computer as a guest.

4. In the *Cancel sync if not connected in* text box, enter the maximum time in seconds (between 5 and 120), that *UConnect* waits for a connection to occur when starting a synchronization session. If *UConnect* cannot connect to the host computer within this time, it cancels the session and reschedules based on the connection retry interval setting. The default value is 15 seconds.
5. In the *If connection fails retry after* text box, enter the number of seconds (between 30 and 9999) that *UConnect* waits before attempting another synchronization after a failed or lost connection. The default value is 30 seconds.
6. In the *When sync completes, resync after* text box, enter the number of minutes (between 10 and 999) that *UConnect* waits after successful synchronization before scheduling another session. The default value is 15 minutes.
7. Select the *Limit connect time per session to* check box to specify the maximum number of minutes that *UConnect* waits for a synchronization session to complete successfully. Then enter the number of minutes (between 10 and 999) in the text box. The default value is enabled, 30 minutes.

   If *UConnect* does not receive a synchronization complete notification from ActiveSync within this time, *UConnect* disconnects from the host computer to allow recovery in instances where ActiveSync on the host computer or mobile computer cannot complete synchronization.
8. Select **Apply** to apply *UConnect* setting changes.

   Select **Restore** to discard *UConnect* setting changes and return to the previous settings.

   Select **Defaults** to restore the default settings. Then select **Apply** to apply the default settings.

Manually Synchronizing

To synchronize a mobile computer immediately without waiting for a scheduled synchronization, select *File - Sync Now*. Note that this option is not active if the mobile computer is not in the cradle, or if synchronization is already in progress.

To exit UConnect and transfer control of docking events and synchronization to ActiveSync, select *File - Exit.*

UConnect Status

To view the status of UConnect events, select *View - Status.* The *Status* window displays the following information.

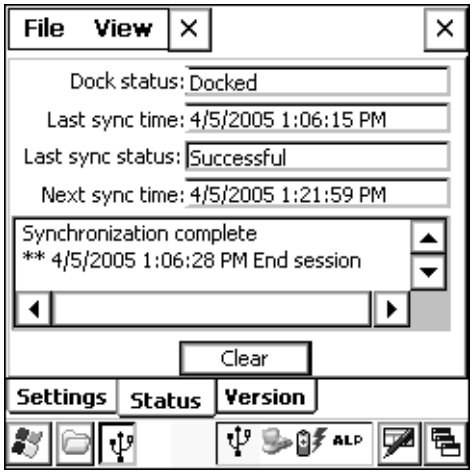


Figure 2-20 UConnect Status Window

- The *Dock status:* field indicates the current docked status of the mobile computer.
- The *Last sync time:* field indicates the date and time the last synchronization session started. If *UConnect* has not performed synchronization, *None* appears. Use this field to determine if successful synchronization occurred since the last time the mobile computer was docked.
- The *Last sync status:* field indicates the status of the most recent or currently active synchronization session. Possible values are:
  - *Successful*: The last synchronization session completed successfully.
  - *Waiting for connection:* Synchronization started and *UConnect* is waiting for the connection with the host to complete.
  - *In progress:* Synchronization started and *UConnect* is waiting for a synchronization complete notification from ActiveSync.
  - *Failed: Cable detached:* Synchronization failed because the mobile computer is not inserted or the USB cable is detached.
  - *Failed: No connection: UConnect* could not establish a connection to the host computer.
  - *Failed: Connection lost:* Connection to the host was lost before synchronization completed.
  - *Failed: Connect time exceeded:* Synchronization did not complete within the maximum time allowed per session.
  - *Failed: No reason:* Synchronization failed for an unknown reason.
- The *Next sync time:* field indicates the date and time of the next scheduled synchronization session. If *UConnect* is disabled, the mobile computer is not inserted, or a session is in progress, *N/A* appears.
- The synchronization history field displays information about docking events and synchronization session status. This field can list up to 100 lines of synchronization history, and can be used to view the status of previous synchronization sessions.
- Select **Clear** to erase the contents of the synchronization history list box.

Chapter 3 ActiveSync

Introduction

To communicate with the host computer, install Microsoft ActiveSync (version 4.0 or higher) on the host computer. Changes made on the mobile computer or host computer appear in both places after synchronization.

ActiveSync software:

- Allows working with mobile computer-compatible host applications on the host computer. ActiveSync replicates data from the mobile computer so the host application can view, enter, and modify data on the mobile computer.
- Synchronizes files between the mobile computer and host computer, converting the files to the correct format.
- Backs up the data stored on the mobile computer. Synchronization is a one-step procedure that ensures the data is always safe and up-to-date.
- Copies (rather than synchronizes) files between the mobile computer and host computer.
- Controls when synchronization occurs by selecting a synchronization mode, e.g., set to synchronize continually while the mobile computer is connected to the host computer, or set to only synchronize on command.
- Selects the types of information to synchronize and control how much data is synchronized.

Mobile Computer Setup

Setup the mobile computer to communicate either with a serial connection or a USB connection. See *Chapter 2, Accessories* provides for accessory setup and cable connection information. Set the mobile computer communication settings to match the communication settings used with ActiveSync.

Installing ActiveSync

To install ActiveSync on the host computer, download the latest version of the software from the Microsoft web site at http://www.microsoft.com. Refer to the installation and RAS instructions included with the ActiveSync software.

NOTE Microsoft recommends installing ActiveSync on the host computer before connecting the mobile computer.

Setting Up an ActiveSync Connection on the Host Computer

1. Select *Start* > *Programs* > *Microsoft ActiveSync* on the host computer. The ActiveSync Window appears.

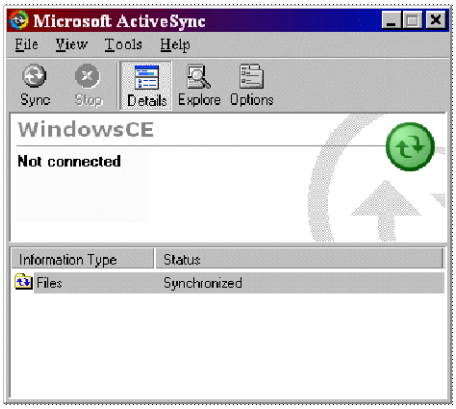


Figure 3-1 ActiveSync Window

NOTE Assign each mobile computer a unique device name. Do not try to synchronize more than one mobile computer to the same name.

2. In the *ActiveSync* window, select *File* > *Connection Settings*. The *Connection Settings* window appears.

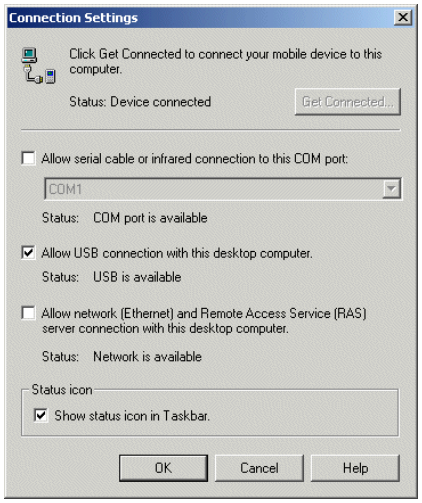

Connection Settings
Click Get Connected to connect your mobile device to this computer.
Status: Device connected
Get Connected...
Allow serial cable or infrared connection to this COM port:
COM1
Status: COM port is available
Allow USB connection with this desktop computer.
Status: USB is available
Allow network (Ethernet) and Remote Access Service (RAS) server connection with this desktop computer.
Status: Network is available
Status icon
Show status icon in Taskbar.
OK
Cancel
Help

Figure 3-2 Connection Settings Window

3. Select the appropriate check box for the type of connection used.

4. Select the *Show status icon in Taskbar* check box.
5. Click **OK** to save any changes made.

Setting up a Partnership

After ActiveSync installation is complete, the ActiveSync Setup Wizard sets up a partnership to synchronize information between the mobile computer and host computer and customize synchronization settings.

To set up a partnership:

1. If the *Get Connected* window does not appear on the host computer, select *Start* > *Programs* > *Microsoft ActiveSync* > *File* > *Get Connected*.

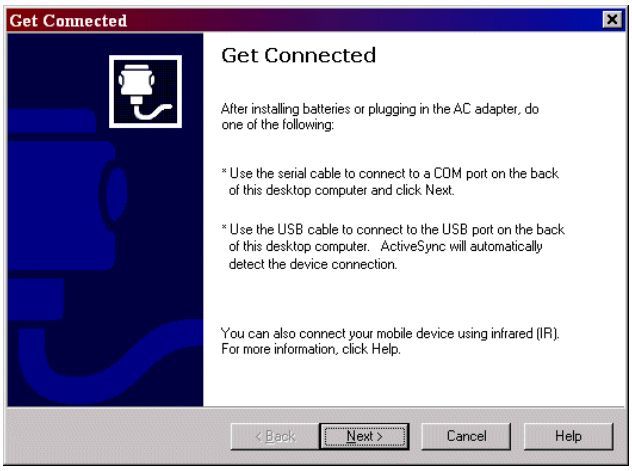

Get Connected
Get Connected
After installing batteries or plugging in the AC adapter, do one of the following:
* Use the serial cable to connect to a COM port on the back of this desktop computer and click Next.
* Use the USB cable to connect to the USB port on the back of this desktop computer. ActiveSync will automatically detect the device connection.
You can also connect your mobile device using infrared (IR). For more information, click Help.
< Back
Next >
Cancel
Help

Figure 3-3 Get Connected Window

2. Connect the mobile computer to the host computer using the appropriate connection. See *Chapter 2, Accessories* for accessory setup.
3. On the host computer, select **Next** in the *Get Connected* window. The host computer and the mobile computer attempt to synchronize. The *New Partnership* window appears.

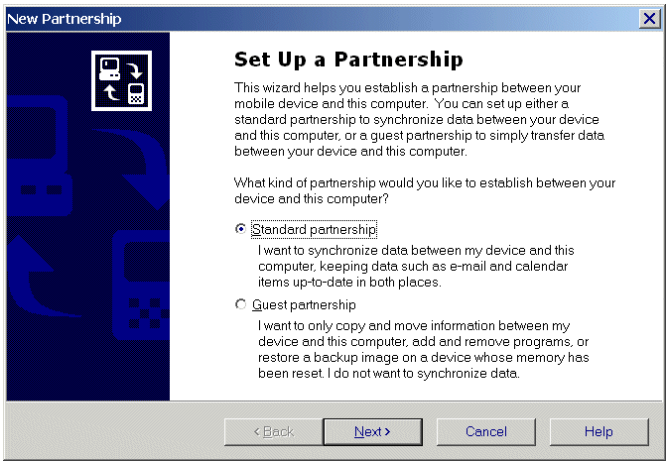

New Partnership
Set Up a Partnership
This wizard helps you establish a partnership between your mobile device and this computer. You can set up either a standard partnership to synchronize data between your device and this computer, or a guest partnership to simply transfer data between your device and this computer.
What kind of partnership would you like to establish between your device and this computer?
Standard partnership
I want to synchronize data between my device and this computer, keeping data such as e-mail and calendar items up-to-date in both places.
Guest partnership
I want to only copy and move information between my device and this computer, add and remove programs, or restore a backup image on a device whose memory has been reset. I do not want to synchronize data.
< Back
Next >
Cancel
Help

Figure 3-4 New Partnership Window

4. Click the *Standard partnership* radio button and then select **Next**. The *New Partnership/Specify how to synchronize data* window appears.

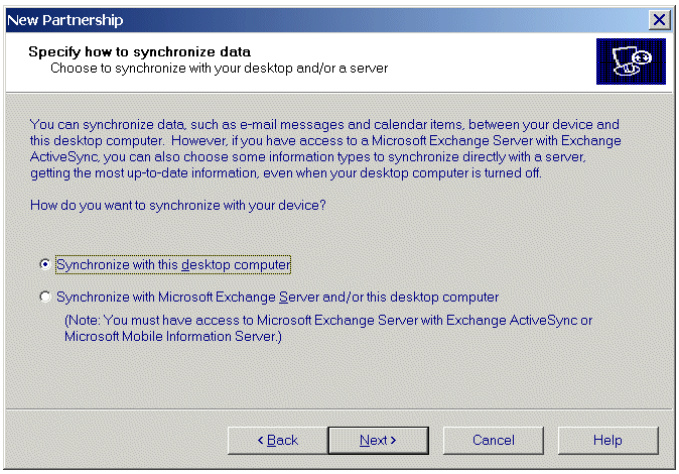

New Partnership
Specify how to synchronize data
Choose to synchronize with your desktop and/or a server
You can synchronize data, such as e-mail messages and calendar items, between your device and this desktop computer. However, if you have access to a Microsoft Exchange Server with Exchange ActiveSync, you can also choose some information types to synchronize directly with a server, getting the most up-to-date information, even when your desktop computer is turned off.
How do you want to synchronize with your device?
Synchronize with this desktop computer
Synchronize with Microsoft Exchange Server and/or this desktop computer
(Note: You must have access to Microsoft Exchange Server with Exchange ActiveSync or Microsoft Mobile Information Server.)
< Back
Next >
Cancel
Help

Figure 3-5 How To Sync Window

5. Click the *Synchronize with this desktop computer* radio button and select **Next**. The *New Partnership/Select Number of Partnerships* window appears.

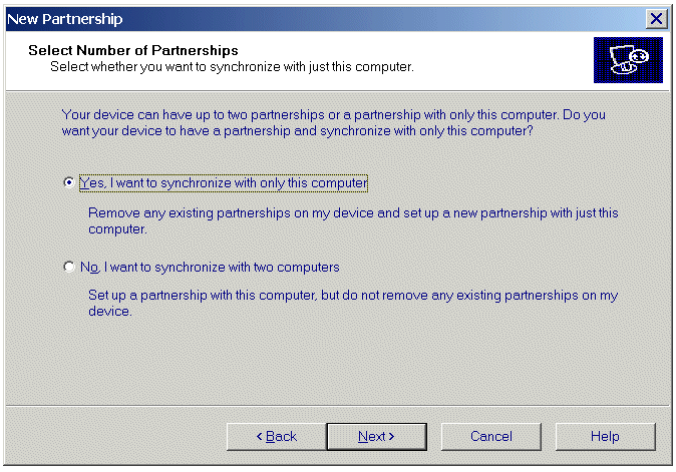

New Partnership
Select Number of Partnerships
Select whether you want to synchronize with just this computer.
Your device can have up to two partnerships or a partnership with only this computer. Do you want your device to have a partnership and synchronize with only this computer?
Yes, I want to synchronize with only this computer
Remove any existing partnerships on my device and set up a new partnership with just this computer.
No, I want to synchronize with two computers
Set up a partnership with this computer, but do not remove any existing partnerships on my device.
< Back
Next >
Cancel
Help

Figure 3-6 Select Number of Partnerships

6. Click the *Yes, I want to synchronize with only this computer* radio button and then select **Next**. The *New Partnership/Select Synchronization Settings* window appears.

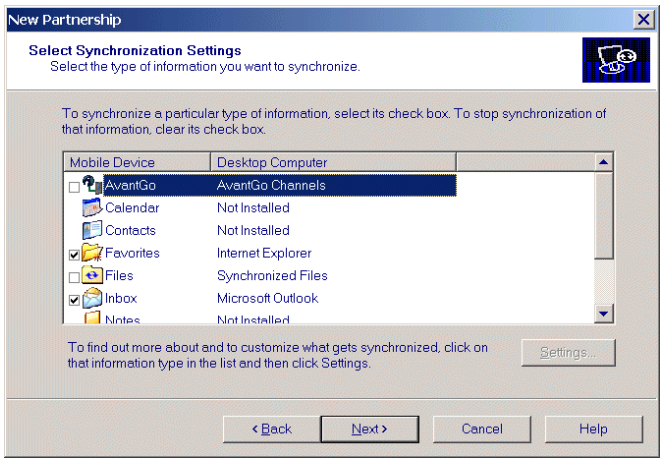


Figure 3-7 Select Synchronization Settings Window

7. To synchronize a particular type of information, select its check box. To stop synchronization of that information, clear its check box.
8. Select **Next**. The *New Partnership/Setup Complete* window appears.

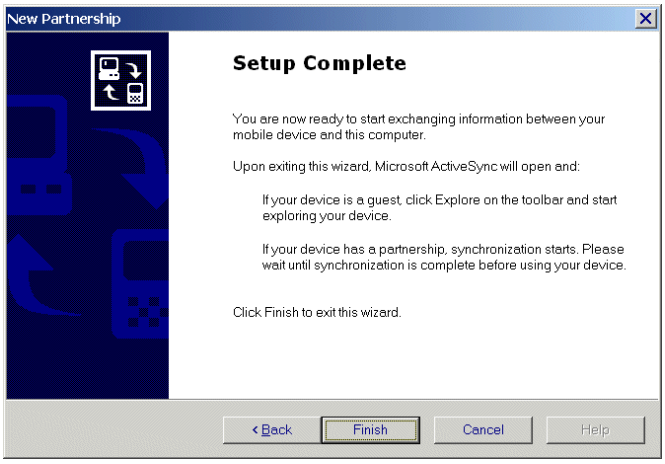

New Partnership
Setup Complete
You are now ready to start exchanging information between your mobile device and this computer.
Upon exiting this wizard, Microsoft ActiveSync will open and:
If your device is a guest, click Explore on the toolbar and start exploring your device.
If your device has a partnership, synchronization starts. Please wait until synchronization is complete before using your device.
Click Finish to exit this wizard.
< Back
Finish
Cancel
Help

Figure 3-8 Setup Complete Window

9. Select **Finish**.

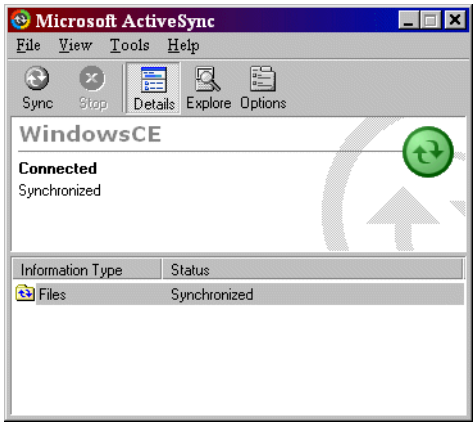


Figure 3-9 ActiveSync Connected Window

The first synchronization copies information stored on the host computer to the mobile computer. When the copy is complete and all data is synchronized, disconnect the mobile computer from the host computer, if desired.

NOTE Perform the first ActiveSync operation a local, direct connection. To retain partnerships after a cold boot, capture partnership registry information in a .reg file and save it in the Flash File System. Detailed information is provided in the SMDK Windows CE Help File for Zebra Mobile Computers. See *Chapter 4, Software Installation on Development PC* for the SMDK installation.

For more information about using ActiveSync, start ActiveSync on the host computer, then see ActiveSync Help.

Chapter 4 Software Installation on Development PC

Introduction

To develop applications to run on the mobile computer, use one or all of the following:

- Symbol Mobility Developer Kit (SMDK) for Embedded Visual C 4.0 (eVC4) for Win CE 4.2
- Symbol Mobility Developer Kit (SMDK) for C for both WinCE 4.2 and Win CE 5.0
- Windows CE Platform SDK for MC1000
- Device Configuration Package (DCP) for MC1000.

The SMDKs are development tools used to create native C and C++ applications for all Zebra mobile computers. It includes documentation, header files (.H), and library files (.LIB) for native code application development that targets Zebra value-add APIs.

The Windows CE Platform SDK for the MC1000 is used in conjunction with the SMDK for eVC4 to create Windows CE applications for the MC1000 mobile computer. The Platform SDK installs a new Windows CE device type and its associated libraries onto the development PC. This new device is added to the Active WCE Configuration field of Microsoft eMbedded Visual C++ 4.0 (eVC4).

The Device Configuration Package (DCP) is required to create and download hex images that represent flash partitions to the mobile computer. The DCP includes the user documentation, flash partitions, Terminal Configuration Manager (TCM) and the associated TCM scripts, and Zebra Configuration Manager (SCM).

Required System Configurations

The minimum system configuration required to use the SMDKs for MC1000 is:

- IBM-compatible host computer with Pentium 450 MHz processor or higher
- Microsoft Windows XP or Microsoft Windows 2000 operating system
- 128 MB RAM
- 100 MB available hard disk space
- CD-ROM drive

- One available serial port
- Mouse
- Adobe® Acrobat® Reader® 3.0 or higher, available at the Microsoft web site: http://www.microsoft.com
- Microsoft ActiveSync version 3.7 or higher, available at the Microsoft web site: http://www.microsoft.com
- Microsoft Embedded Visual C++ v4.0 with SP2
- Microsoft Windows Mobile 2003 SDK.

DCP for MC1000

Installing

To install the DCP for MC1000:

1. Download the DCP from the Support Central website, http://www.zebra.com/support:
   a. Select *Software Downloads*.
   b. Select *MC1000*.
   c. On the MC1000 Product page, select the *Device Configuration Package (DCP) for MC1000* from the *Software Downloads* section.
   d. Save the .exe file to the development computer.
2. Locate the .exe file on the development computer, double-click the file, and follow the install screen prompts.
3. Once installed, access the major components of the DCP from the *Device Configuration Package (DCP) for MC1000* program group of the *Windows Start Menu*.

Components

Table 4-1 lists the components of the MC1000 DCP.

Table 4-1 DCP for MC1000 Components and Locations

Component	Description	Directory Location
Files that make up the flash partitions	Used to configure the mobile computer.	\Program Files\Symbol Device Configuration Packages\MC1000\v1.0\Flash Folders
Hex image - default location	Loads onto the mobile computer for configuration.	\Program Files\Symbol Device Configuration Packages\MC1000\v1.0\Hex Images
User Documentation	User manuals that provide guidance on using and integrating the MC1000.	\Program Files\Symbol Device Configuration Packages\MC1000\v1.0
Readme	Contains important information for the DCP.	\Program Files\Symbol Device Configuration Packages\MC1000\v1.0
Scripts	Used to customize flash partitions.	\Program Files\Symbol Device Configuration Packages\MC1000\v1.0\TCM Scripts

Table 4-1 DCP for MC1000 Components and Locations (Continued)

Component	Description	Directory Location
Terminal Configuration Manager (TCM)	An application used to customize flash file system partitions for the mobile computer.	\Program Files\Symbol\TCM2
Symbol Configuration Manager (SCM)	An application used to create registry (.REG) files that set configuration parameters on Zebra mobile computers.	\Program Files\Symbol\SCM
Tools (e.g. Keyboard remap, if any)	Used in developing applications for the mobile computer.	\Program Files\Symbol Device Configurations package\MC1000\v1.0\Tools\kbtool
Start Menu: Readme User Documentation TCM SCM WEB Updates	Specifies items to appear in the Start menu.	\Documents and Settings\All Users\Start Menu\Programs

Platform SDK

To download and install the MC1000 Platform SDK:

1. Download the appropriate Platform SDK from the Support Central web site, http://www.zebra.com/support.
   a. Select *Software Downloads*.
   b. Select *MC1000*.
   c. On the MC1000 Product page, select the appropriate Platform SDK for MC1000 from the *Software Downloads* section.
   d. Save the .exe file to the development computer.
2. Run the file and follow the screen prompts to install.

Symbol Mobility Developer Kits

Refer to the *Developer Guide for Zebra Device* for more information about the SMDKs available for this product.

To install an SMDK:

1. Download the SMDK from the Support Central website, http://www.zebra.com/support:
   a. Select *Software Downloads*.
   b. Select *MC1000*.
   c. On the MC1000 Product page, select the appropriate Symbol Mobility Developer Kit for C from the *Software Downloads* section.
   d. Save the .exe file to the development computer.
2. Double-click the executable file and follow the install screen prompts.
3. Once installed, access the major components of the SMDK from the *Symbol Mobility Developer Kit* program group of the Windows *Start* menu. The components include: Help, Platform Integrator, Readme, Samples, and Web Updates.

Download updates to the SMDK from the Developer Zone web site at http://developer.zebra.com. Check this site periodically for important updates and new software versions.

Installing Other Development Software

Developing applications for the mobile computer may require installing other development software such as application development environments on the development PC. Follow the installation instructions provided with this software.

Chapter 5 Software Installation on Mobile Computer

Introduction

With the appropriate accessory, software, and connection, the mobile computer can share information with the host device. This chapter provides information about installing software and files on the mobile computer.

To download and install software use:

- ActiveSync
- IPL
- SD Card.

ActiveSync

Use ActiveSync to copy files from a host computer to the mobile computer.

1. Ensure that ActiveSync is installed and that a partnership has been created. See *Chapter 3, ActiveSync* for more information.
2. Connect the mobile computer to the host computer using a USB cradle or an appropriate cable. See *Chapter 2, Accessories* for connection information.
3. On the host computer, select *Start* > *Programs* > *ActiveSync*.

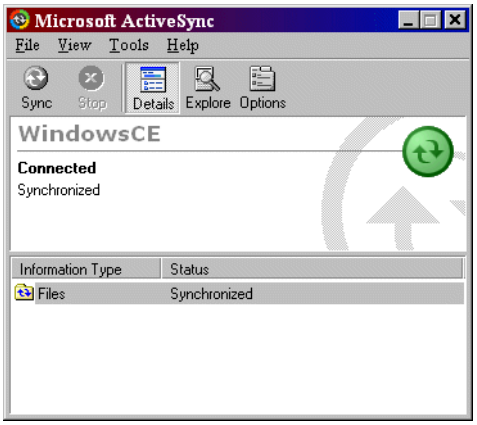


Figure 5-1 ActiveSync Connected Window

4. Select *Explore*.

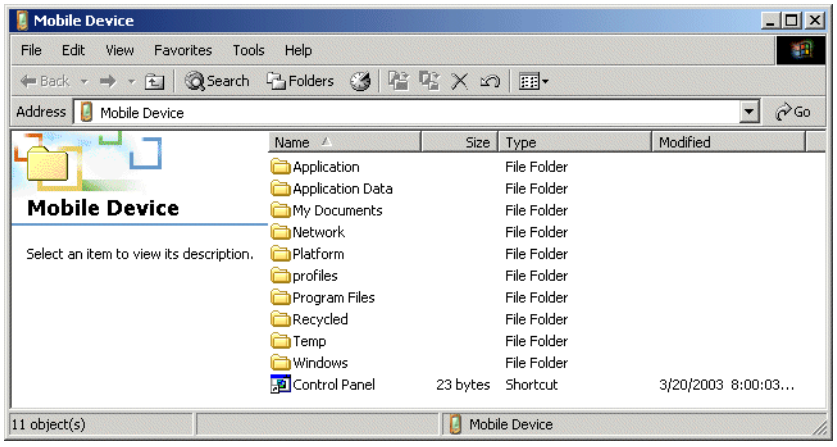


Figure 5-2 ActiveSync Explorer

5. Double-click a folder to expand the contents of the folder.

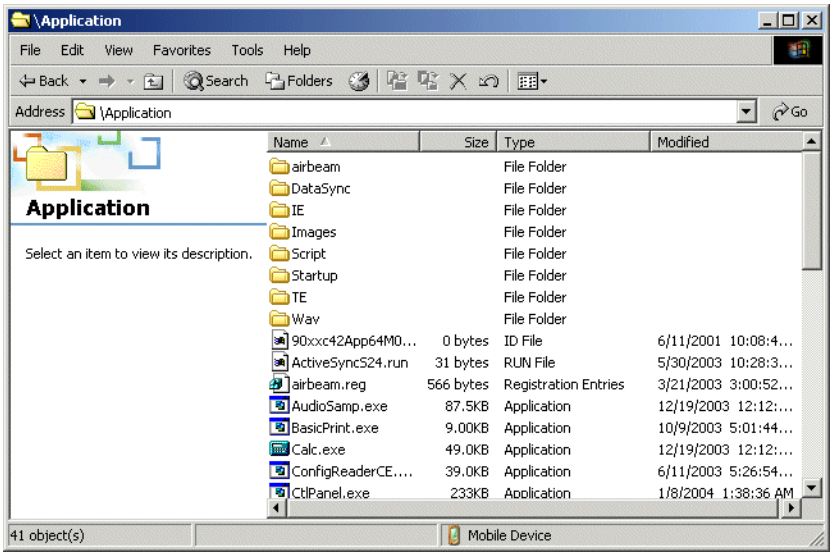


Figure 5-3 Application Folder Contents

6. Use Explorer to locate the host computer directory that contains the file to download. Click that directory in the left pane to display its contents in the right pane.
7. Drag the desired file(s) from the host computer to the desired mobile device folder.
   - *Program Files* folder: files stored in this folder are discarded after a cold boot.
   - *Application* folder: files stored in this folder are retained after a cold boot.

Adding Programs

Install the appropriate software on the host computer before installing it on the mobile computer:

1. Download the program to the host computer (or insert the CD or disk that contains the program into the host computer). The program may consist of a single *.exe file, a *.zip file, or a Setup.exe file.
2. Read any installation instructions, Read Me files, or documentation that comes with the program. Many programs provide special installation instructions.
3. Connect the mobile computer to the host computer.
4. Double-click the executable file on the host computer.

   If the file is an installer, the installation wizard begins. Follow the directions on the window. Once the software is installed on the host computer, the installer transfers the software to the mobile computer.

   If the file is not an installer, an error message states that the program is valid but is designed for a different type of computer. Move this file to the mobile computer. Follow the installation instructions for the program in the Read Me file or documentation, or use ActiveSync Explore to copy the program file to the Program Files folder on the mobile computer as described in *ActiveSync on page 5-1*. For more information on copying files using ActiveSync, see ActiveSync Help.
5. When installation is complete, select *Start* > *Programs* on the mobile computer, then select the program icon.

IPL

See *Chapter 6, Creating/Loading Hex Images* to download customized flash file system partitions to the mobile computer and load hex files to the flash memory of the mobile computer using IPL.

SD Card

Use an SD card to download/upload files to and from the mobile computer. See *SD/SDIO Card on page 1-9* for instruction on installing the card.

Chapter 6 Creating/Loading Hex Images

Introduction

Terminal Configuration Manager (TCM) is an application used to customize flash file system partitions for the mobile computer. The most common use is to create an application partition hex file that contains the customer's application. TCM can also be used to load hex files to the flash memory of the mobile computer.

The program resident on the mobile computer that receives the hex file and burns it to the flash memory is called Initial Program Loader (IPL).

TCM scripts control the customization of partitions. The scripts contain all of the necessary information for building an image. The script is a list of copy commands specifying the files to copy from the development computer to the partition.

TCM works with a pair of directory windows, one displaying the script and the other displaying the source files resident on the development computer. Use standard drag and drop operations to add and delete from the script window.

The DCP includes scripts used by Zebra to build the standard factory installed *Platform* and *Application* partitions provided on the mobile computer. The standard *Platform* partition contains drivers while the *Application* partition contains demo applications and optional components. The standard TCM scripts can be found in the following folder: *C:\Program Files\Symbol Windows CE SMDK (MC1000)\SymbolPlatforms \MC1000\TCMScripts*.

NOTE Before creating a script to build a hex image, identify the files required (system files, drivers, applications, etc.) and locate the files' source directories to make the script building process easier.

The required processes for building a hex image in TCM include:

- Starting TCM
- Defining script properties
- Creating the script for the hex image
- Building the image
- Sending the hex image
- Creating a splash screen
- Flash storage.

Starting Terminal Configuration Manager

Click the Windows start menu TCM icon (*Windows CE SMDK for Series 1000*) to start TCM. The *TCM* window appears displaying two child windows: *Script1* and *File Explorer*. The *Script1* window contains a newly created script and the *File Explorer* window contains a file explorer view used for selecting files to place in the script.

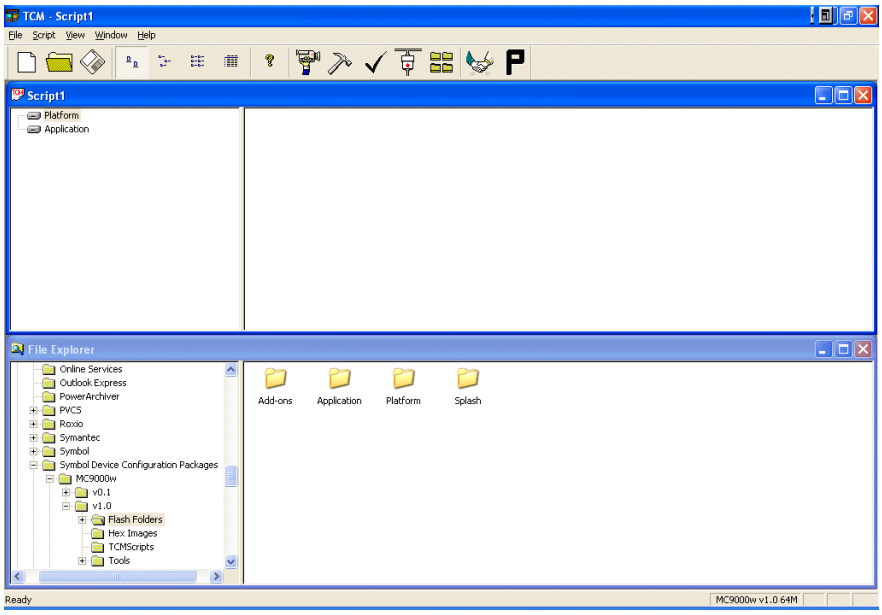


Figure 6-1 TCM Startup Window

The following table lists the components of the TCM window.

Table 6-1 *TCM Components*

Icon	Component	Function
	Script window	Displays the files to use in the creation of the partition(s).
	File Explorer window	Used to select the files to add to the script.
	Create button	Create a new script file.
	Open button	Open an existing script file.
	Save button	Save the current script file.

Table 6-1 *TCM Components (Continued)*

Icon	Component	Function
	Large icons button	View the current script items as large icon.
	Small icons button	View the current script items as small icon.
	List button	View the current script items as a list.
	Details button	View the current script items with more details.
	About button	Display version information for TCM.
	Properties button	View/change the current script properties.
	Build button	Build the current script into a set of hex files.
	Check button	Check the script for errors (files not found).
	Send button	Download the hex image to the mobile computer.
	Tile button	Arrange the sub-windows in a tiled orientation.
	Build and Send	Build the current script into a set of hex images and send the hex images to the mobile computer.
	Preferences button	View/change the global TCM options.

Defining Script Properties

Define script properties before creating a script This defines the type of mobile computer, flash type, number of disks being created, and the memory configuration of each disk partition.

To define the script properties:

1. Select the *Script* window to make it active.
2. Click the **Properties** button. The *Script Properties* window > *Partition Data* tab appears.

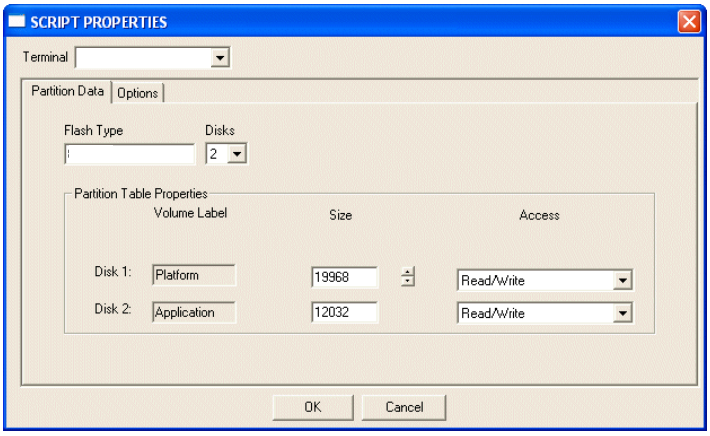


Figure 6-2 Script Properties Window - Partition Data Tab

3. In the *Terminal* drop-down list, ensure the *MC1000w v1.0 64M* entry is selected.
4. Use the default *Flash Type*.
5. In the *Disks* drop-down list, select the number of disk partitions to create.
6. Select the (memory) *Size* for each partition. Note that adding space to one disk partition subtracts it from another.
7. In the *Access* drop-down list for each disk partition, determine and select the Read/Write access option.
8. Click the *Options* tab.

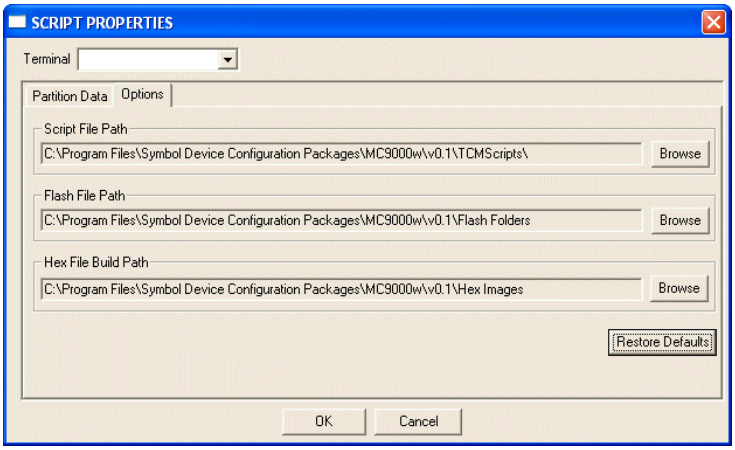


Figure 6-3 Script Properties Window - Options Tab

9. Set the paths for the Script File, Flash File, and Hex File Build.
10. Click **OK**.

Creating the Script for the Hex Image

On start-up, *TCM* displays the *TCM* window with the *Script1* window and *File Explorer* window pointing to the following directory:

\Program Files\Symbol Device Configuration Packages\MC1000w\v0.1\TCMScripts\

The *Script1* window directory pane displays two partitions: *Platform* and *Application*. Depending on the type of flash chip, the number of partitions may change. Files can be added to each of the partitions. TCM functionality includes:

- Opening a new or existing script file
- Copying components to the script window
- Saving the script file.

Opening a New or Existing Script

A script file can be created from scratch or based on an existing script file. Click **Create** to create a new script or click **Open** to open an existing script (for example, a script provided in the MC1000 DCP). If changes are made to an existing script saving the changes overwrites the original script. To avoid this use the *Save As* function to save the script using a different file name.

Updating TCM 1.X Scripts

To upgrade script files created with older versions of TCM to TCM 2.0 scripts click **Open** to open the existing script. The *Conversion* window appears.

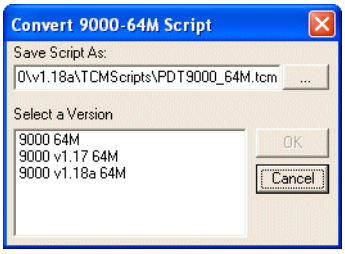


Figure 6-4 Conversion Window - Upgrading to TCM 2.0

In the *Select a Version* field, select a version and then click **OK**.

Copying Components to the Script

Script contents are managed using standard file operations such as *New Folder*, *Delete,* and *Rename*. To add items to the script files and folders in the *File Explorer* window and drag them to the *Script* window. The *File Explorer* window supports standard windows; to select multiple files click while holding the **SHIFT** or **CTRL** keys.

Saving the Script

To save modifications to a script file use the *Save* or the *Save As* function. Saving changes to an existing script over writes the original script. To use a Zebra-supplied standard script as a base and save the changes in a new script, use the *Save As* function.

Building the Image

After creating the script, build the hex image defined by the script.

As part of the build, TCM performs a check on the script which verifies that all files referenced in the script exist. This check is important for previously created scripts to ensure that files referenced in the script are still in the designated locations.

To build scripts:

1. Click **Build** on the TCM toolbar. The *Configure Build* window appears.

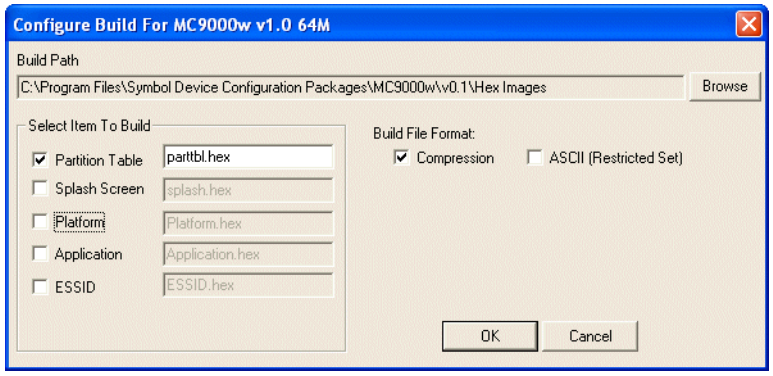


Figure 6-5 Configure Build Window

2. Select the items (partitions) to build using the check box(es) to the left of each named partition.
3. Specify the *Build Path* to define where to store all built partitions.
4. Select the hex image check box to reduce the size and speed up the download.
5. Click **OK** and follow the on-screen instructions.

   If building the splash screen partitions, a prompt appears requesting both the source bitmap file and the destination hex file.
6. TCM perform a check and if there are no errors, creates the partition hex files.

If the build fails, TCM does not create the hex files and displays an error message. Two of the most common reasons for a build failure are:

- Files defined in the script can not be found. This error can occur when the files referenced by the script are no longer stored on the development computer or the folders where they are stored were renamed.
- The total amount of flash memory space required by the script exceeds the image size. To correct this, reduce the number of files in the partition or increase the size of the partition. See *Defining Script Properties on page 6-4* for more information about setting the image size appropriately.

Downloading the Hex Image

Once the hex file is built, download it to the mobile computer.

Using a Serial or USB Connection

To load the hex files on to the mobile computer:

1. For downloads using either a serial or a USB connection, connect the mobile computer to the development computer using the Single Slot Serial/USB cradle or MC1000 Communication/Charge cables.

   CAUTION Ensure that power is applied to the mobile computer. To ensure a successful download, do not remove power from the mobile computer while in IPL mode.

2. Press and hold a yellow **Scan** button and the **Power** button simultaneously until the mobile computer resets into IPL.
3. When the *Initial Program Loader* menu appears, release the scan button and **Power** button.

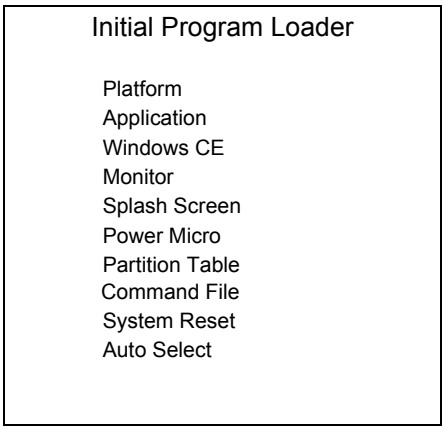


Figure 6-6 Initial Program Loader Menu

4. Choose *Auto Select* or use the up and down scroll buttons to select the partition to download, then press **ENT**.

Table 6-2 *IPL Menu Partitions*

Partition Name	Description
Platform	Contains the files in the Platform folder.
Application	Contains the files in the Application folder.
Config Block	Contains information to correctly configure the operating system for the mobile computer. This information is loaded by the manufacturer. Note: Ensure that a correct config block is loaded in the mobile computer. Loading an incorrect config block prevents the correct operation of the mobile computer.
Windows CE	Contains the operating system for the mobile computer.
Monitor	Contains the Monitor and IPL programs.
Splash Screen	Contains the splash screen that displays while booting the mobile computer. Note: Splash screens are generated from .bmp images. See *Splash Screen Format on page 6-17*. For mono displays, the bmp image must be 8 bits per pixel (bpp).
Power Micro	The Power Micro is a small computer contained within the mobile computer that controls several system resources. In the unlikely event that the Power Micro firmware needs updating, select this item to program the device.
Partition Table	Contains the partition information for all other partitions. Note: The partition table should never need changing unless the sizes of the platform and application images are changed within TCM. If this is done, load the new partition table first, followed by both platform and application in any order.
Command File	Displays the *Select Transport* menu, USB or ActiveSync Uart - Serial selection.
System Reset	Exits IPL and cold boots the operating system.
Auto Select	Allows downloading one or more files without manually selecting the destination. (The content of the downloaded files directs the file to the correct destination.) For technical reasons, Auto Select can not be used to download Monitor, Power Micro, or Partition Table. These items must be specifically selected.

NOTE If the platform or application partition size changes, download a new partition table first.

5. IPL displays the *Select Transport* menu which lists the available methods of downloading the file.

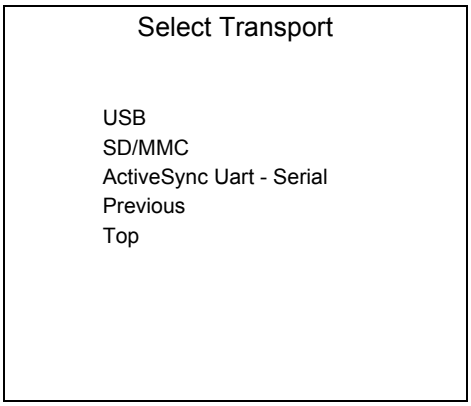


Figure 6-7 Select Transport Menu

6. Use the up and down scroll keys to select either the *ActiveSync Uart - Serial* transport method or the *USB* transport method, then press **ENT**.
7. If the *ActiveSync Uart - Serial* transport method is selected, the *Select Baud Rate* menu appears.

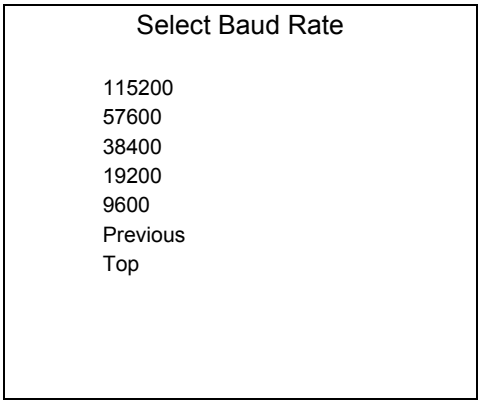


Figure 6-8 Select Baud Rate Menu

8. Use the up and down scroll keys to select the appropriate baud rate, then press **ENT**.
9. Before the download starts, if *ActiveSync Uart - Serial* was selected in the *Select Transport* menu, *Waiting for Data* appears in the *Device Status* field.

10. If *USB* was selected in the *Select Transport* menu, the *Waiting for Download* message appears.

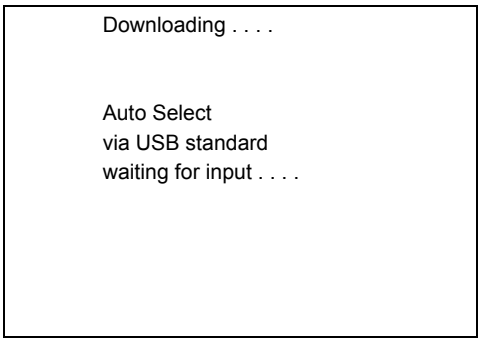


Figure 6-9 Waiting for Download

11. On the development computer, click **Load** on the TCM toolbar. The *Load Terminal* window - *Serial* tab appears.

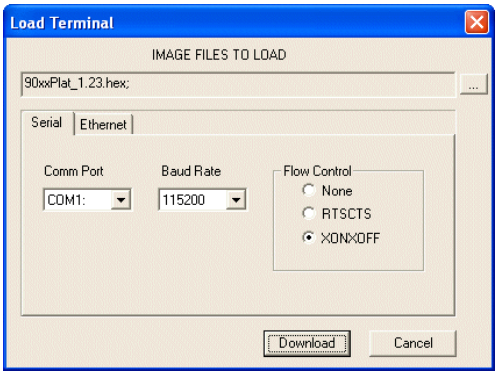


Figure 6-10 Load Terminal Window - Serial Tab

12. Select the *Image Files To Load.*

NOTE The *USB: Zebra Device* option does not appear on the *Comm Port* drop-down list until after the *Waiting for Download* message has completed.

13. Select either *Serial* or *USB: Zebra Device* from the *Comm Port* drop-down list.
14. For serial connections, select the *Baud Rate* from the *Baud Rate* drop-down list.
15. Click **Download** to begin the download process. The *Downloading* screen on mobile computer displays the *Device Status* and a progress bar.
16. When complete, *Device Status* displays *Result was: Success!*, or in the case of an error, the cause of the error.

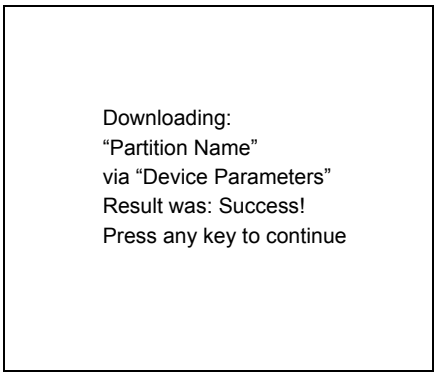


Figure 6-11 Downloading Complete Screen

17. Press **ENT** to return to the *IPL* menu to select the next partition to download.
18. To exit IPL, select the *System Reset* item from the IPL menu.

Using a SD/MMC Card

To load the hex files on to the mobile computer:

1. Copy the hex image files from the development computer to the root directory of an SD/MMC card.

CAUTION Ensure that power is applied to the mobile computer. To ensure a successful download, do not remove power from the mobile computer while in IPL mode.

2. Install the SD/MMC card into the mobile computer. See *SD/SDIO Card on page 1-9* for SD card installation instructions.
3. Press and hold a yellow **Scan** button and the **Power** button simultaneously until the mobile computer resets into IPL.
4. When the *Initial Program Loader* menu appears, release the scan button and **Power** button.

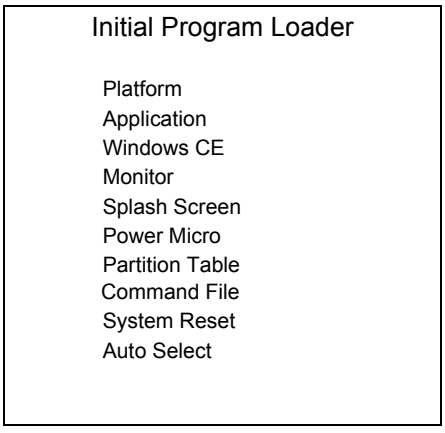


Figure 6-12 Initial Program Loader Menu

5. Choose *Auto Select* or use the up and down scroll buttons to select the partition to download, then press **ENT**. See *Table 6-2 on page 6-8* for IPL Menu partition descriptions.

NOTE If the platform or application partition size changes, download a new partition table first.

6. IPL displays the *Select Transport* menu which lists the available methods of downloading the file.

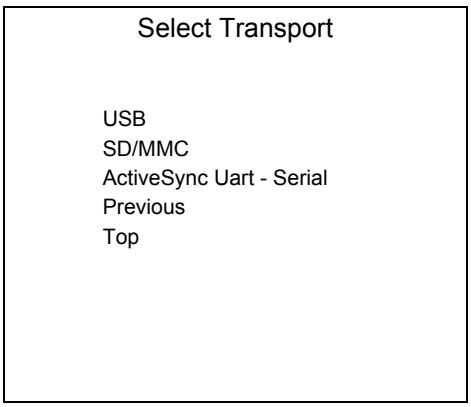


Figure 6-13 Select Transport Menu

7. Use the up and down scroll keys to select *SD/MMC* transport method, then press **ENT**.

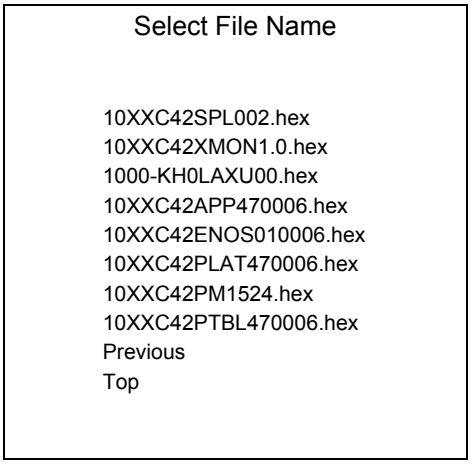


Figure 6-14 Select File Name Menu

8. Use the up and down scroll keys to select the file to download.

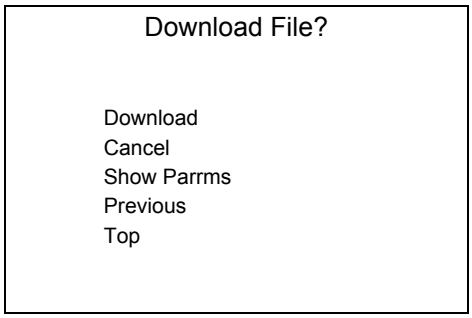


Figure 6-15 Download File Menu

9. Use the up and down scroll keys to select *Download*.
10. Before the download starts, if *ActiveSync Uart - Serial* was selected in the *Select Transport* menu, *Waiting for Data* appears in the *Device Status* field.
11. If *USB* was selected in the *Select Transport* menu, the *Waiting for Download* message appears.

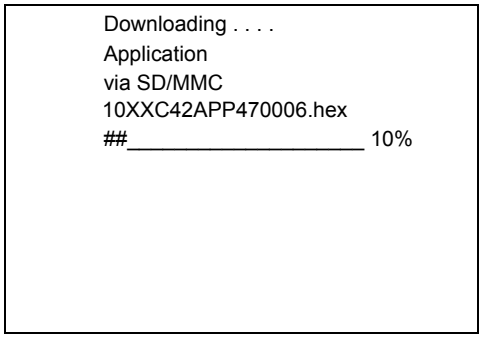


Figure 6-16 Downloading Screen

12. When complete, *Device Status* displays *Result was: Success!*, or in the case of an error, the cause of the error.

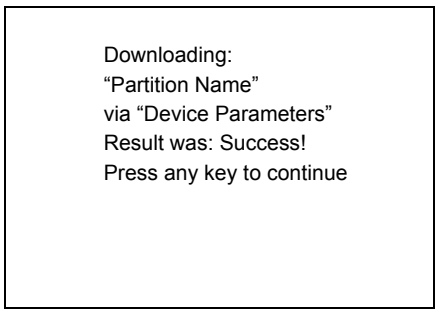


Figure 6-17 Downloading Complete Screen

13. Press **ENT** to return to the *IPL* menu to select the next partition to download.
14. To exit IPL, select the *System Reset* item from the IPL menu.

TCM Error Messages

TCM validates the cells in the partition table when the **Execute** button is clicked. Cells highlighted in red contain an error. Partition loading is disabled until all errors are corrected.

Table 6-3 *TCM Error Messages*

Error	Description/Solution
Failed to build images: flash file system DLL not loaded!	TCM could not load the DLL required to build images for the targeting flash file system. Reinstall TCM or recover the DLL.
Failure finding directory xxx	Building process failed because directory xxx was not found.
Failure creating volume	Building process failed because TCM could not create a certain disk volume.
Failure adding system file to image	Build process failed because TCM failed to add a certain system file to the disk image.
INVALID PATH	The path for the image file to build is not valid.
Nothing Selected To Build	In the Config Build window, no item is selected to build.
Illegal ESS ID	In the Build ESSID Partition window, no ESS ID was entered or the ESS ID entered was illegal.
Disk Full	TCM failed to create Hex image file at the selected path. Check available disk space.
Target Disk Full	Build process failed because TCM failed to add file to the image of a disk volume. Remove some files or increase the disk size.
Hex file is READ ONLY	The Hex image file to be created exists and is read-only. Delete the existing file or change its attribute.
Error opening the file xxx with write access	TCM could not open file xxx with write access. Check if file is in use.
Failure creating binary file	TCM failed to open/create an intermediate binary file.
Hex File To load is missing or invalid	In *Load Terminal* window, the file selected to load has invalid status.
Could not locate terminal name in TCM.ini file	While loading the *Script Properties* window, TCM could not find the TCM.ini section corresponding to the mobile computer type specified by the current opening script. Either TCM.ini or the script file is invalid.
Incorrect disk sizes in TCM.ini file	The total disk size specified in the script does not match the total disk size defined in the corresponding TCM.ini section. Check if the script is corrupt or the TCM.ini has changed after the script was created.
INVALID DIRECTORY	In *Script Properties* window, the selected System File Path is not a valid directory.
One of the disk sizes is one sector in size	In *Script Properties* window, one of the disks is too small (one sector in size). This may cause problem while building images, especially when cushion is enabled. Increase the disk size.

Table 6-3 *TCM Error Messages (Continued)*

Error	Description/Solution
INVALID VOLUME NAME	In *Script Properties* window, one of the volume labels is not valid.
Corrupt TCM.INI file! (Invalid value of VolumeDivisor)	The VolumeDivisor entry is missing or invalid in the TCM.ini. Reinstall TCM or recover TCM.ini.
Invalid version of TCM script file	The TCM script was not created by this version of TCM.
Corrupt or missing TCM.ini file	TCM could not find TCM.ini file.
FAILED CONNECTION TO COM PORT (Could not get status)	While downloading images to mobile computer, TCM failed to connect to the selected COM port. Check if the COM port is free and is properly configured.
FAILED CONNECTION TO TERMINAL (Terminal Not Connected Properly/Terminal Not Ready to Receive)	While downloading images, TCM failed to connect to the mobile computer. Check if the correct flow control protocol is selected and the mobile computer is properly connected and is in a listening state.

IPL Error Detection

While receiving data, IPL performs many checks on the data to ensure that the data is received correctly. If an error is detected, IPL immediately aborts the download, and reports the error on an error screen.

Error screens vary depending on the action performed. A sample error screen may look like the screen pictured below:

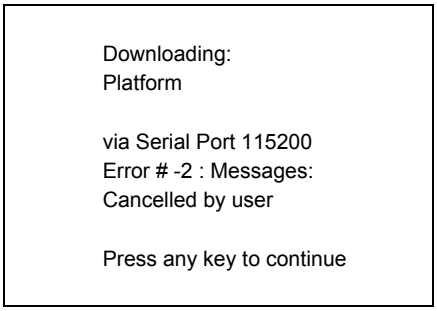


Figure 6-18 IPL Error Screen

This error message screen displays until a key is pressed. Once the screen is acknowledged, IPL returns to the *Initial Program Loader* main menu to wait for a new selection.

To find the probable cause of the error, use the error number and/or the error text displayed on the screen to look up the error in *Table 6-4*.

Table 6-4 *IPL Errors*

Error Text	Error Number	Probable Cause
Unknown error	-1	A general error occurred. Retry the download. If the failure persists, it is most likely due to a hardware failure; the mobile computer requires servicing.
Cancelled by user	-2	The user cancelled the download.
Can't open the source	-7	An error occurred opening the source device (either radio card or serial port). Check source device connectivity and retry.
Can't open the destination	-8	An error occurred opening the destination device (either flash ROM or Power Micro). Retry the download. If the failure persists, it is most likely due to a hardware failure; the mobile computer requires servicing.
Can't read from the source device	-9	The source device (either radio card or serial port) could not be read from. Check source device connectivity and retry.
Can't write to the destination device	-10	The destination device (either flash ROM or Power Micro) could not be written to. Retry the download. If the failure persists, it is most likely due to a hardware failure; the mobile computer requires servicing.
Transmission checksum error	-11	An error occurred during transmission from the source device (either radio card or serial port) and the checksum check failed. Check source device connectivity and retry.
Readback checksum error	-12	A checksum, generated from reading back data that was written to the destination device, was incorrect. An error during transmission or a write error to the destination device could cause this.
There is no more heap space available	-14	There is no more heap space available for the download procedure. Restart IPL and retry the download. If the failure persists, contact service with details of what is being downloaded.
Insufficient data available to complete record	-21	A Symbol hex file download was attempted but the hex file is invalid. Ensure the file is in Symbol hex file format.
Invalid Symbol HEX file	-23	A Symbol hex file download was attempted but the hex file is invalid. Ensure the file is in Symbol hex file format.
Unrecognized or unsupported HEX record	-24	The Symbol hex file being downloaded contains an invalid or unrecognized hex record. Ensure the file is in proper Symbol hex file format.
Invalid data in HEX file	-25	The Symbol hex file being downloaded contains invalid data. Ensure the file is in proper Symbol hex file format with valid hex data.
Exceeded max size	-26	The download file is too large to fit into the space allocated for it. Either make the file smaller or increase the space allocated for it by altering the partition table.
Partition is not valid on this device	-27	The downloaded file specifies a partition entry that does not exist on the device. Only download files that are valid for this device, or change the partition table so that the new file is valid on the device.

Table 6-4 *IPL Errors (Continued)*

Error Text	Error Number	Probable Cause
Wrong destination code	-28	A specific partition was chosen from the Main Menu (not Auto Select) but the file selected for download was for another partition. Ensure that the partition selected from the Main Menu matches the file selected for download.
File type does not support IPL Auto Select	-29	Monitor, Power Micro and Partition Table cannot be loaded with Auto Select. Select the appropriate area, and try again.
Non-contiguous record found	-30	A Symbol hex file download was attempted but the hex file is invalid. Ensure the file is in Symbol hex file format.
Timed Out - No data	-31	IPL was waiting for data from the source device but timed out before receiving any. Check the source device connectivity and retry.
Fail: Buffer Overrun	-32	The serial port device could not keep up with incoming data. Retry the serial download with a lower baud rate.
Partition Table not Valid	-33	The size of flash memory is different than that described in the partition table. Retry the download with the correct partition table file.
Invalid file format	-34	The file format is invalid. IPL only supports Symbol hex files.

Creating a Splash Screen

The MC1000 CDCP includes source bitmap files used to create the default splash screens for the mobile computer. Modify these files using any of the standard windows image editors to allow customization.

To create a custom splash screen:

1. Use the image editor to open the Splashmono.bmp file supplied with the Series 1000 DCP.
2. Modify the bitmap file and save.
3. Create a splash partition using the steps shown in *Building the Image on page 6-6*.

Splash Screen Format

If the default files are not used to create the new splash screens, be sure to preserve the image format. The formats are as follows:

Table 6-5 *Splash Screen Format*

Screen Type	Dimensions	Color Format
Monochrome	216 x 240	8 bits per pixel

See *Downloading the Hex Image on page 6-7* for information about loading the splash screen using TCM and IPL.

Flash Storage

In addition to the RAM-based storage standard on Windows CE mobile computers, the mobile computer is also equipped with a non-volatile Flash-based storage area which can store data (partitions) that can not be corrupted by a cold boot. This Flash area is divided into two categories: Flash File System (FFS) Partitions and Non-FFS Partitions.

FFS Partitions

The mobile computer includes two FFS partitions. These partitions appear to the mobile computer as a hard drive that the OS file system can write files to and read files from. Data is retained even if power is removed.

The two FFS partitions appear as two separate folders in the Windows CE file system and are as follows:

- Platform: The Platform FFS partition contains Zebra-supplied programs and Dynamic Link Libraries (DLLs). This FFS is configured to include DLLs that control system operation. Since these drivers are required for basic mobile computer operation, only experienced users should modify the content of this partition.
- Application: The Application FFS partition is used to store application programs needed to operate the mobile computer.

Working with FFS Partitions

Because the FFS partitions appear as folders under the Windows CE file system, they can be written to and read like any other folder. For example, an application program can write data to a file located in the Application folder just as it would to the Windows folder. However, the file in the Application folder is in non-volatile storage and is not lost on a cold boot (e.g., when power is removed for a long period of time).

Use standard tools such as ActiveSync to copy files to and from the FFS partitions. They appear as the “Application” and “Platform” folders to the ActiveSync explorer. This is useful when installing applications on the mobile computer. Applications stored in the Application folder are retained even when the mobile computer is cold booted, just as the Demo 1000 program is retained in memory.

There are two device drivers included in the Windows CE image to assist developers in configuring the mobile computer following a cold boot: RegMerge and CopyFiles.

RegMerge.dll

RegMerge.dll is a built-in driver that allows modify the Windows CE Registry. Regmerge.dll runs very early in the boot process and looks for registry files (.reg files) in certain Flash File System folders during a cold boot. It then merges the registry changes into the system registry located in RAM.

Since the registry is re-created on every cold boot from the default ROM image, the RegMerge driver is necessary to make registry modifications persistent over cold boots.

RegMerge is configured to look in the root of two specific folders for .reg files in the following order:

\Platform

\Application

Regmerge continues to look for .reg files in these folders until all folders are checked. This allows folders later in the list to override folders earlier in the list. This way, it is possible to override Registry changes made by the

Platforms partitions folders. Take care when using Regmerge to make Registry changes. The MC1000 DCP contains examples of .reg files.

NOTE Regmerge only merges the .reg files on cold boots. A warm boot skips the merge process.

Typically, do not make modifications to registry values for drivers loaded before RegMerge. However, these values may require modification during software development. Since these early loading drivers read these keys before RegMerge gets a chance to change them, the mobile computer must be cold booted. The warm boot does not re-initialize the registry and the early loading driver reads the new registry values.

Do not use Regmerge to modify built-in driver registry values, or merge the same Registry value to two files in the same folder, as the results are undefined.

CopyFiles

Windows CE expects certain files to be in the Windows folder, residing in volatile storage. Windows CE maintains the System Registry in volatile storage. CopyFiles copies files from one folder to another on a cold boot. A cold boot copies files from a non-volatile partition (Application or Platform) to the Windows or other volatile partition during a cold boot. During a cold boot CopyFiles looks for files with a .CPY extension in the root of the Platform and Application FFS partitions (Platform first and then Application). These files are text files containing the source and destination for the desired files to be copied separated by “>”. The following example from the file application.cpy is contained on the demo application partition included in the MC1000 DCP. Also obtain this from the Support Central web site at http://www.zebra.com/support.

Files are copied to the Windows folder from the Flash File System using copy files (*.cpy) in the following order:

\Platform

\Application

Example:

\Application\ScanSamp2.exe>\Windows\ScanSamp2.exe

This line directs CopyFiles to copy the ScanSamp2.exe application from the \Application folder to the \Windows folder.

Non-FFS Partitions

Non-FFS Partitions include additional software and data pre-loaded on the mobile computer that can be upgraded. Unlike FFS Partitions, these partitions are not visible when the operating system is running. They also contain system information. Non-FFS partitions include the following:

- Windows CE: The complete Windows CE operating system is stored on Flash devices. If necessary, download the entire OS image to the mobile computer using files provided by Zebra. The current OS partition on the mobile computer is included as part of the TCM installation package. Obtain any upgrades from Zebra. This partition is mandatory for the mobile computer.
- Splash Screen: a bitmap smaller than 16 Kb (and limited to 8 bits per pixel) appears as the mobile computer cold boots. To download a customized screen to display, see *Creating a Splash Screen on page 6-17*.

NOTE 8 bits per pixel only applies to splash screen images. Once Windows CE is running, the color density is 16 bits per pixel.

- IPL: This program interfaces with the host computer and allows downloading via cradle or serial cable any or all of the partitions listed above, as well as updated versions of IPL. Use caution downloading updated IPL

versions; incorrect downloading of an IPL causes permanent damage to the mobile computer. IPL is mandatory for the mobile computer.

- Partition Table: Identifies where each partition is loaded in the mobile computer.

Downloading Partitions to the Mobile Computer

Use TCM to specify a hex destination file for each partition and download each file to the mobile computer. This download requires a program loader stored on the mobile computer. The mobile computer comes with a program loading utility, Initial Program Loader (IPL), stored in the mobile computer's write-protected flash.

IPL

IPL allows the user to upgrade the mobile computer with software updates and/or feature enhancements.

Partition Update vs. File Update

There are two types of updates supported by the mobile computer: partitions and files. The MC1000 uses the same file system as the file system used on a desktop computer. A file is a unit of data that can be accessed using a file name and a location in the file system. Replacing a file erases the contents of the previous file. The operating system must be running for a file to be updated, so the IPL cannot perform individual file updates as it is a stand-alone program that does not require the operating system to be running.

A typical partition is a group of files combined into a single “partition” that represents a specific area of storage. Examples of partitions are the flash file systems such as Platform or Application. (Using the desktop computer comparison, these partitions are roughly equivalent to a C: or D: hard disk drive.) In addition to the “hard disk” partitions, some partitions are used for single items such as the operating system, monitor, or splash screen. (Again using a desktop computer comparison, these partitions are roughly the equivalent of the BIOS or special hidden system files.) Updating a partition erases all data previously in its storage region - i.e., it is not a merge but rather a replacement operation. Typically, the operating system is not running when partitions are updated, so IPL can perform partition updates.

Use TCM to create partition images for selected partitions. All partition images suitable for use by IPL are in hex file format for transfer by TCM from the development computer to the mobile computer.

Upgrade Requirements

- The hex files to be downloaded (on development computer)
- A connection from the host computer and the mobile computer (either serial or wireless)
- TCM (on development computer) to download the files.

After satisfying these requirements, invoke IPL and navigate the menu to upgrade the MC1000. See *Downloading the Hex Image on page 6-7* for procedures on downloading a hex file to the mobile computer.

Chapter 7 AirBEAM Smart

Introduction

The AirBEAM Smart product allows specially designed software packages to be transferred between a host server and Zebra handheld devices. Before transfer, AirBEAM Smart checks and compares package version, so that only updated packages are loaded.

AirBEAM Smart resides on client devices and allows them to request, download and install software, as well as to upload files and status data. Both download and upload of files can be accomplished in a single communications session. The ability to transfer software over a network can greatly reduce the logistical efforts of client software management.

In an AirBEAM Smart system, a network-accessible host server acts as the storage point for the software transfer. The AirBEAM Smart Client uses the industry standard FTP or TFTP file transfer protocols to check the host system for updates and if necessary, to transfer updated software.

AirBEAM Package Builder

In a typical distributed AirBEAM Smart system, software to be transferred is organized into packages. In general, an AirBEAM Smart package is simply a set of files that are assigned attributes both as an entire package and as individual component files. The package is assigned a version number and the transfer occurs when an updated version is available.

An AirBEAM Smart package can optionally contain developer-specified logic to be used to install the package. Installation logic is typically used to update client device flash images. Examples of common AirBEAM Smart packages would include packages for custom client application software and AirBEAM Smart Client software.

Once these packages are built, they are installed on the host server for retrieval by the handheld device. The AirBEAM Package Builder is a utility used to define, generate and install AirBEAM packages to a server. The packages are then loaded from the server onto a client device equipped with an AirBEAM Smart Client executable.

For detailed instructions on how to define, generate and install AirBEAM packages to the server, refer to the *AirBEAM Package Builder Product Reference Guide*, p/n 72-55769-xx.

AirBEAM Smart Client

The AirBEAM Smart Client is installed on the handheld mobile computer. It is configured with the server access information, the names of the packages to be downloaded and other controlling parameters. When the AirBEAM Smart Client is launched, the device connects to the specified FTP server and checks the packages it is configured to look for. If the package version was updated, the client requests the transfer.

AirBEAM Smart License

The AirBEAM Smart Client is a licensed software product. The AirBEAM Smart Client version synchronization functionality is enabled through a license key file that is stored on the client device. The license key file can be built into AirBEAM Smart Client's image, or downloaded in a special AirBEAM package. The AirBEAM Smart license key file contains a unique key and a customer specific banner that is displayed when the AirBEAM Smart Client version synchronization logic is invoked.

The AirBEAM Smart Client package that is included on the mobile computer does not include a licence key. This software version is limited to downloading of specific Zebra software products. A license key can be purchased that will allow the downloading of custom applications and other non-Zebra software products.

Configuring the AirBEAM Smart Client

1. Select *Start - Programs - AirBEAM Client*. The *AirBEAM CE* window appears.
2. Select *File - Configure*. The *AirBEAM* configuration window appears.

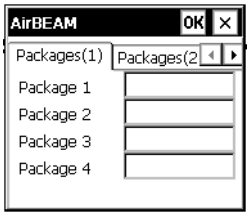


Figure 7-1 AirBEAM Smart Configuration Window

The configuration window is used to view and edit AirBEAM Smart Client configurations. This dialog box has six tabs that can be modified - Packages(1), Packages(2), Server, Misc(1), Misc(2) and Misc(3).

Packages(1) Tab

This tab is used to specify the package name of the first four of eight packages that are to be loaded during the AirBEAM synchronization process. The specified package name must correspond to a package that is available on the specified package server.

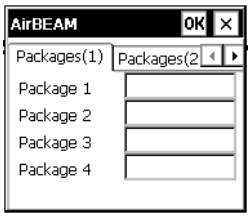


Figure 7-2 Package (1) Tab

Field	Description
Package 1	Package name of the first of eight packages. This is an optional field.
Package 2	Package name of the second of eight packages. This is an optional field.
Package 3	Package name of the third of eight packages. This is an optional field.
Package 4	Package name of the fourth of eight packages. This is an optional field.

NOTE No inadvertent trailing spaces should be entered on the Packages(1) tab. Information entered in these fields are case and space sensitive.

Packages(2) Tab

This tab is used to specify the package name of the last four of eight packages that are to be loaded during the AirBEAM synchronization process. The specified package name must correspond to a package that is available on the specified package server.

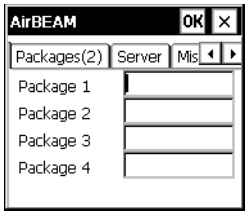


Figure 7-3 Package (2) Tab

Field	Description
Package 5	Package name of the fifth of eight packages. This is an optional field.
Package 6	Package name of the sixth of eight packages. This is an optional field.
Package 7	Package name of the seventh of eight packages. This is an optional field.
Package 8	Package name of the eighth of eight packages. This is an optional field.
Upload Pkg	Package name of a package that is to be processed for “upload files” during the AirBEAM synchronization process. The specified package name must correspond to a package that is available on the specified package server. This is an optional field.

NOTE No inadvertent trailing spaces should be entered on the Packages(2) tab. Information entered in these fields are case and space sensitive.

Server Tab

This tab is used to specify the configurations of the server to which the client connects during the package synchronization process.

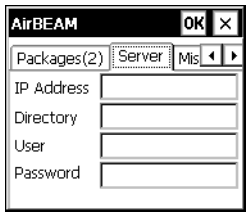


Figure 7-4 Server Tab

Field	Description
IP Address	The IP Address of the server. It may be a host name or a dot notation format.
Directory	The directory on the server that contains the AirBEAM package definition files. All AirBEAM package definition files are retrieved from this directory during the package synchronization process.
User	The FTP user name that is used during the login phase of the package synchronization process.
Password	The FTP password that corresponds to the FTP user specified in the **User** field. The specified password is used during the login phase of the package synchronization process.

NOTE No inadvertent trailing spaces should be entered on the Server tab. Information entered in these fields are case and space sensitive.

Misc(1) Tab

This tab is used to configure various miscellaneous features.

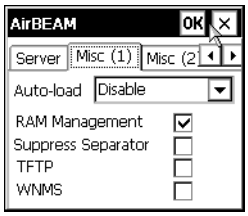


Figure 7-5 Misc (1) Tab

Table 7-1 Misc(1) Tab

Field	Description
Auto-load	This drop-down list is used to specify how the AirBEAM Smart Client is to be invoked automatically when the client device is rebooted. The selections are: **Disable**: the AirBEAM Smart Client is not invoked automatically during the boot sequence. **Interactive**: the AirBEAM Smart Client is invoked automatically during the boot sequence. The package synchronization process is started automatically. The *Synchronization Dialog* box appears and the user is required to press the **OK** button when the process is complete. **Non-interactive**: the AirBEAM Smart Client is invoked automatically during the boot sequence. The package synchronization process is started automatically. The *Synchronization Dialog* box is displayed, but the user is not required to select **OK** when the process is complete. The *Synchronization Dialog* box terminates automatically. **Background**: the AirBEAM Smart Client is invoked automatically during the boot sequence. The package synchronization process is started automatically. Nothing is displayed while the synchronization process is occurring.
RAM Management	This check box specifies whether the automatic RAM management is enabled during the package synchronization process. If enabled, RAM management logic is invoked when there is not enough free disk space to download a package. The RAM management logic attempts to remove any discardable AirBEAM packages resident on the client.
Suppress Separator	This check box specifies whether the automatic insertion of a file path separator character should be suppressed when the client generated server package definition file names. When enabled, the parameter also disables the appending of .apd to the package. This feature is useful for AS/400 systems, in which the file path separator character is a period. When this feature is enabled, the server directory (Directory) and package name (Package 1, Package 2, Package 3 and Package 4) are appended “as is” when building the name for the server package definition file. When this feature is disabled, a standard file path separator is used to separate the server directory (Directory) and package name (Package 1, Package 2, Package 3 and Package 4) when building the name for the server package definition file. In addition, an .apd extension is appended automatically.
TFTP	This check box specifies whether the TFTP protocol is to be used to download files. By default, the AirBEAM Smart Client uses the FTP protocol.
WNMS	This check box specifies whether the AirBEAM Smart Client uploads a WNMS information file at the end of each version synchronization.

Misc(2) Tab

This tab is used to configure various miscellaneous features.

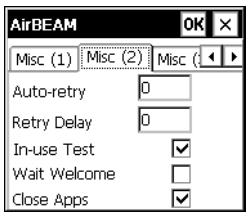


Figure 7-6 Misc (2) Tab

Field	Description
Auto-retry	This field is used to specify whether the AirBEAM Smart Client automatically retries if there is a failure during the synchronization process. If this feature is enabled, the AirBEAM Smart Client displays a popup dialog indicating the attempt of a retry. The popup dialog is displayed for the number of seconds specified in the *Retry Delay* field. The valid values for this field are: **-1**: the AirBEAM Smart Client automatically retries indefinitely. **0**: the AirBEAM Smart Client does not automatically retry. **-0**: the AirBEAM Smart Client automatically retries up to the number of times specified.
Retry Delay	This field specifies the amount of time, in seconds, that the AirBEAM Smart Client delays before automatically retrying after a synchronization failure.
In-use Test	This check box specifies whether the AirBEAM Smart Client tests to determine if a file is in-use before downloading. If the *In-use Test* feature is enabled, the AirBEAM Smart Client downloads a temporary copy of any files that are in-use. If any temporary in-use files are downloaded the AirBEAM Smart Client automatically resets the client to complete the copy of the in-use files. If the *In-use Test* feature is disabled, the synchronization process fails (-813) if any download files are in-use.
Wait Welcome	This check box specifies whether the AirBEAM Smart Client waits for the WELCOME windows to be completed before automatically launching the synchronization process after a reset.
Close Apps	This check box specifies whether the AirBEAM Smart Client automatically attempts to close non-system applications prior to resetting the mobile unit. If enabled the AirBEAM Smart Client sends a WM_CLOSE message to all non-system applications before resetting the mobile unit. This feature offers applications the opportunity to prepare (i.e. close open files) for the pending reset.

Misc(3) Tab

This tab is used to configure various miscellaneous features.

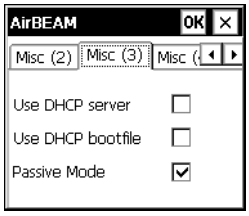


Figure 7-7 Misc (3) Tab

Field	Description
Use DHCP server	This check box control specifies whether the AirBEAM Smart Client uses the DHCP response option 66 to specify the *IP address* of the FTP/TFTP server. If enabled, special RF network registry settings are required to force the DHCP server to return the “TFTP server name” field (option 66). The special RF network registry settings are included, but commented out, in the radio network registry initialization files (essid_xxxx_yy.reg).
Use DHCP bootfile	This check box control specifies whether the AirBEAM Smart Client uses the DHCP response option 67 to specify the *Package* and *Package 1* parameters. If enabled, special RF network registry settings are required to force the DHCP server to return the “Bootfile name” field (option 67). The special RF network registry settings are included, but commented out, in the radio network registry initialization files (essid_xxxx_yy.reg).

Misc(4) Tab

This tab is used to configure various miscellaneous features.

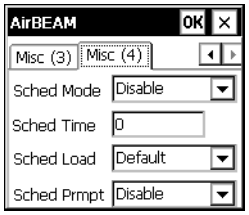


Figure 7-8 Misc (4) Tab

Table 7-2 Misc (4) Tab Descriptions

Field	Description
Sched Mode	Specifies whether (and how) the scheduled mode is enabled. If enabled, schedule mode causes the AirBEAM synchronization process to occur periodically. The selections are: **Disable** - The schedule mode is disabled. **Fixed time** - The schedule mode is enabled. The AirBEAM synchronization will be launched once per day at the time specified in the Sched Time setting. The synchronization will be launched every day Sched Time minutes past midnight. **Fixed period** - The schedule mode is enabled. The AirBEAM synchronization will be launched at a period by the Sched Time setting. The synchronization will be launched every Sched Time minutes.
Sched Time	This edit control specifies, in minutes, the period for the schedule mode. The Sched Mode setting specifies how the Sched Time value is used.
Sched Load	This drop-down menu specifies the load mode to be used for scheduled synchronization, if enabled. The selections are: **Default** - Specifies that the load mode specified in the Auto-load setting is to be used for scheduled synchronization sessions. **Interactive** - The Synchronization Dialog displays when a scheduled synchronization session occurs. The user is required to press the OK button to dismiss the dialog. **Non-interactive** - The Synchronization Dialog displays when a scheduled synchronization session occurs. The dialog is automatically dismissed when the synchronization is complete, unless an error occurs. If an error occurs the user is required to press the OK button to dismiss the dialog. **Background** - Nothing is displayed when the scheduled synchronization sessions occur.
Sched Prompt	Specifies whether the AirBEAM client prompts the user when updates are available in schedule mode. The settings are: **Disable** - Updated packages are automatically downloaded. The user is not prompted. **Alert** - Updated packages are not automatically downloaded. The user is prompted to warm boot the device to initiate the package downloads. **Launch** - Updated packages are not automatically downloaded. The user is prompted to start the package download. The user can defer the package download by responding no to the prompt. The MAXNOPRESS registry setting can be used to limit the number of times the user can defer the update. **Confirm** - Updated packages are not automatically downloaded. This value behaves the same as the Launch value, except that the user is required to confirm an additional prompt before the download starts.

Synchronizing with the Server

When the synchronization process is initiated, the AirBEAM Smart Client attempts to open an FTP session using the AirBEAM Smart Client configuration. Once connected, the client processes the specified packages. Packages are loaded only if the server version of a given package is different from the version loaded on the client. Once the upload process is complete, the AirBEAM Smart Client closes the FTP session with the server.

The AirBEAM Smart Client can launch an FTP session with the server either manually, when initiated by the user, or automatically.

Manual Synchronization

1. Configure the AirBEAM Smart Client. See *Configuring the AirBEAM Smart Client on page 7-2*.
2. From the main *AirBEAM CE* window, press **ALT** - **ALT** and select **Synchronize**.
3. Once connected, the AirBEAM Synchronize window appears.

Figure 7-9 AirBEAM Synchronize Window

- The **Status List** displays status messages that indicate the progress of the synchronization process.
- Press **ENTER** to return to the Main Menu. This button remains inactive until the synchronization process is complete.
- Select **Retry** and press **ENTER** to restart the synchronization process. This button is activated only if there is an error during the synchronization process.

Automatic Synchronization

The AirBEAM Smart Client can be configured to launch automatically using the Misc(1) Preference tab (see *Misc(1) Tab on page 7-4*). When setting automatic synchronization, use the Auto-load drop-down list to specify how the AirBEAM Smart Client should be invoked automatically when the client device is rebooted. See *Misc(1) Tab on page 7-4* for instructions on enabling Auto Sync.

AirBEAM Smart Staging

The AirBEAM Smart staging support is intended to speed up and simplify the process of staging custom or updated operating software onto mobile devices directly from manufacturing. The staging support is part of the AirBEAM Smart CE Client that is integrated into the mobile computer.

The AirBEAM Smart support works by defaulting the AirBEAM Smart Client configuration to a known set of values and launching the AirBEAM Smart package download logic. A staging environment, including an RF network, FTP server and AirBEAM Smart packages must be setup. Ideally a staging network and server should be setup to match the default AirBEAM Staging client configuration.

The AirBEAM Smart staging utility is invoked by selecting the *Files* icon from the *Series 3000 Demo* screen, select *\Platform\AirBeam* and double tap on the *abstage.lnk* file.

The AirBEAM Staging support provides several benefits:

- Many devices can be simultaneously loaded over the RF network.
- The AirBEAM staging utility provides a simple single dialog user interface that is used to quickly start the software installation process.

Chapter 8 Maintenance and Troubleshooting

Introduction

This chapter includes instructions on cleaning and storing the mobile computer, and provides troubleshooting solutions for potential problems during mobile computer operation.

Maintaining the Mobile Computer

For trouble-free service, observe the following tips when using the mobile computer:

- Do not scratch the screen of the mobile computer. When working with the mobile computer, use the supplied stylus or plastic-tipped pens intended for use with a touch-sensitive screen. Never use an actual pen or pencil or other sharp object on the surface of the mobile computer screen.
- Although the mobile computer is water and dust resistant, do not expose it to rain or moisture for an extended period of time. In general, treat the mobile computer as a pocket calculator or other small electronic instrument.
- The screen of the mobile computer is glass. Do not drop the mobile computer or subject it to strong impact.
- Protect the mobile computer from temperature extremes. Do not leave it on the dashboard of a car on a hot day, and keep it away from heat sources.
- Do not store or use the mobile computer in any location that is extremely dusty, damp, or wet.
- Use a soft lens cloth to clean the mobile computer. If the surface of the mobile computer screen becomes soiled, clean it with a soft cloth moistened with a diluted window-cleaning solution.

Troubleshooting

Mobile Computer

Table 8-1 Troubleshooting the Mobile Computer

Problem	Cause	Solution
Mobile computer does not turn on.	Main battery not charged.	Charge or replace the main battery in the mobile computer.
	Main battery not installed properly.	Ensure battery is installed properly. See *Main Battery Installation on page 1-3*.
	System crash.	Perform a warm boot. If the mobile computer still does not turn on, perform a cold boot. See *Waking the Mobile Computer on page 1-8*.
Rechargeable main battery did not charge.	Battery failed.	Replace battery. If the mobile computer still does not operate, try a warm boot, then a cold boot. See *Waking the Mobile Computer on page 1-8*.
	Mobile computer removed from cradle while battery was charging.	Insert mobile computer in cradle and begin charging. The standard main battery requires up to 4 hours to recharge fully and the extended life main battery requires up to 6 hours to recharge fully.
	Extreme battery temperature.	Battery does not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).
Cannot see characters on display.	Mobile computer not powered on.	Press the **Power** button.
During data communication, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle or unplugged from host computer during communication.	Replace the mobile computer in the cradle, or reattach the cable and re-transmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software was incorrectly installed or configured.	Perform setup as described in *Chapter 3, ActiveSync*.
Mobile computer does not emit sound.	Volume setting is low or turned off.	Adjust volume setting.

Table 8-1 Troubleshooting the Mobile Computer (Continued)

Problem	Cause	Solution
Mobile computer turns itself off.	Mobile computer is inactive.	The mobile computer turns off after a period of inactivity. This period can be set from 1 to 5 minutes, in one-minute intervals.
	Battery is depleted.	Replace the battery.
	Battery is not inserted properly.	Insert the battery properly. See *Main Battery Installation on page 1-3*.
A message appears stating that the mobile computer memory is full.	Too many files stored on the mobile computer.	Delete unused memos and records. If necessary, save these records on the host computer.
	Too many applications installed on the mobile computer.	Remove unused installed applications from the mobile computer to recover memory.
The mobile computer does not accept scan input.	Scanning application is not loaded.	Verify that the mobile computer is loaded with a scanning application. See the system administrator.
	Unreadable bar code.	Ensure the symbol is not defaced.
	Distance between exit window and bar code is incorrect.	Ensure mobile computer is within proper scanning range.
	Mobile computer is not programmed for the bar code type.	Ensure the mobile computer is programmed to accept the type of bar code scanned.
	Mobile computer is not programmed to generate a beep.	Check that the application is set to generate a beep on good decode.
	Battery is low.	Check the battery level. When the battery is low, the mobile computer automatically goes into suspend mode.

Single Slot Serial/USB Cradle

Table 8-2 Troubleshooting the Single Slot Serial/USB Cradle

Symptom	Possible Cause	Action
Charge LEDs do not light when mobile computer or spare battery is inserted. See *Figure 2-1 on page 2-2*.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	Mobile computer is not seated correctly in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.
	Spare battery is not seated correctly in the cradle.	Remove and re-insert the spare battery into the charging slot, ensuring it is correctly seated. Note polarity icon on battery.
	Extreme battery temperature.	Battery does not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).
Mobile computer battery is not charging.	Mobile computer was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure mobile computer is seated correctly. If a mobile computer battery is fully depleted, it can take up to four hours to fully recharge the Li-ion battery.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Mobile computer is not fully seated in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.
	Extreme battery temperature.	Battery does not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).
Spare battery is not charging.	Battery not fully seated in charging slot.	Remove and re-insert the spare battery into the cradle, ensuring it is correctly seated. Note polarity icon on battery.
	Battery inserted incorrectly.	Ensure the contacts are facing down and toward the back of the cradle. Note polarity icon on battery.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Extreme battery temperature.	Battery does not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).
During data communications, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle during communications.	Replace mobile computer in cradle and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communications software is not installed or configured properly.	Perform setup as described in *Communication on page 2-13*.

Four Slot USB Cradle

Table 8-3 Troubleshooting the Four Slot USB Cradle

Symptom	Possible Cause	Action
Charge LEDs do not light when mobile computer is inserted. See *Figure 2-1 on page 2-2*.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	Mobile computer is not seated correctly in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.
	Extreme battery temperature.	Battery does not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).
Mobile computer battery is not charging.	Mobile computer was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure mobile computer is seated correctly. If a mobile computer battery is fully depleted, it can take up to four hours to fully recharge the Li-ion battery.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Mobile computer is not fully seated in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.
	Extreme battery temperature.	Battery does not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).
During data communications, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle during communications.	Replace mobile computer in cradle and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communications software is not installed or configured properly.	Perform setup as described in *Communication on page 2-13*.

Cables

Table 8-4 Troubleshooting the Cables

Symptom	Possible Cause	Action
Mobile computer charge LED does not light when mobile computer is connected.	Cable is not receiving power.	Ensure the power cable is connected securely to both the cable and to AC power.
	Mobile computer is not seated correctly in the cable.	Remove and re-insert the mobile computer into the cable, ensuring it is correctly seated.
	Extreme battery temperature.	Battery does not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).

Table 8-4 Troubleshooting the Cables (Continued)

Symptom	Possible Cause	Action
Mobile computer battery is not charging.	Mobile computer was removed from cable or cable was unplugged from AC power too soon.	Ensure cable is receiving power. Ensure mobile computer is seated correctly. If a mobile computer battery is fully depleted, it can take up to four hours to fully recharge the battery.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Mobile computer is not fully seated in the cable.	Remove and re-insert the mobile computer into the cable, ensuring it is correctly seated.
	Extreme battery temperature.	Battery will not charge if battery temperature is below 32°F (0°C) or above 104°F (40°C).
During data communication, no data was transmitted, or transmitted data was incomplete.	Cable removed from mobile computer during communication.	Reattach cable to mobile computer and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software is not installed or configured properly.	Perform setup as described in *Chapter 3, ActiveSync*.

Appendix A Specifications

Technical Specifications

Mobile Computer

Table A-1 summarizes the mobile computer's intended operating environment.

Table A-1 Mobile Computer Technical Specifications

Item	Description
Operating Temperature	14° to 122°F (-10° to +50°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Battery Charging Temperature	-32° to 104°F (0° to 40°C)
Humidity	0% to 85% non-condensing at 122° F (50°C)
Electrostatic Discharge (ESD)	+/-15 kV (air) (RH 50%); +/- 8 kV (contact)
Sealing	IP54 category 2
Shock and Vibration	Drop/Shock: 2 times per side (12 drops total of the same unit) from a height of 3.94 feet (1.2 M) to concrete at -10°C, 23°C and 50°C Tumble: 500, ½ meter tumbles (1 tumble = 2 drops) Vibration: 4G's, random, 5 Hz to 2,000 Hz vibration Cargo/Packaged: Six (6) foot drop at 23°C, 5 Hz, Vibration < 20 lbs Vehicle stacking 96", 23°C, and 85% relative humidity

Table A-1 Mobile Computer Technical Specifications (Continued)

Item	Description
Dimensions	6.42 in L x 2.54 in W x 1.50 in H (163 mm L x 64.5 mm W x 38 mm H)
Weight (with Li-ion Battery)	7.23 oz (205 g)
Display	Non-touch monochrome
Main Battery	Rechargeable Lithium-ion 1800 mAh minimum (3.7 VDC), or three AAA Alkaline batteries
Backup Battery	Ni-MH battery (rechargeable), 20 mAh (3.6 VDC) 3 cells
Operating Platform	Microsoft® Embedded Windows® CE 5.0 Core
Processor/Memory	Intel® XScale™ PXA 312MHz with 32MB RAM/32MB Flash
Interface	RS-232, 115.2 kbps max USB Client
Data Capture	Code 39, Code 128, Code 93, Codabar,EAN-8, EAN-13,Interleaved 2 of 5, UPCA, UPCE and UPC/EAN supplements, RSS-14/Limited/Expanded, MSI Plessey, IATA 2 of 5, Coupon Code
Secure Digital (SD) Cards	The following Sandisk SD cards have been tested and qualified*: SDSDB-64-201-80 (64 MB) SDSDB-128-201-80 (128 MB) SDSDB-512-201-80 (512 MB) *Zebra disclaims all liability of any kind whatsoever, including without limitations, liability under tort, contract, intellectual property rights or any other legal theory, for the performance of the above Sandisk SD cards and/or their interoperability (or the lack thereof) with any Zebra product, and does not warrant or in any way guarantee that such Sandisk SD cards will operate in conjunction, in combination or in integration with the Zebra MC1000 or any other Zebra product. The above information is offered on an “as is” basis, and does not constitute business, legal, professional, technical or any other advice.

Single-Slot Serial/USB Cradle

Table A-2 summarizes the Single-Slot Serial/USB cradle's technical specifications.

Table A-2 Single-Slot Serial/USB Cradle Technical Specifications

Item	Description
Operating Temperature	-32° to 122°F (0° to +50°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Battery Charging Temperature	32° to 104°F (0° to 40°C)
Humidity	5% to 95% non-condensing at 122° F (50°C)
Electrostatic Discharge (ESD)	+/-15 kV (air) (RH 50%); +/- 8 kV (contact)
Drop	30 in. (0.76 m) to vinyl tiled concrete
Shock and Vibration	Drop/Shock: 2 times per side (12 drops total of the same unit) from a height of 30 in. (0.76 m) to concrete at room temperatures Vibration: 4G's, random, 20 Hz to 2,000 Hz vibration Cargo/Packaged: Six (6) foot drop at 23°C, 5 Hz, Vibration < 20 lbs Vehicle stacking 96", 23°C, and 85% relative humidity
Dimensions	4.00 in. L x 3.25 in. W x 3.00 in. H (102 mm L x 83 mm W x 77 mm H)
Weight	4.94 oz (140 g)
Interface	RS-232, 115.2 kbps max, USB (miniB connector)

Four-Slot USB Cradle

Table A-2 summarizes the Four-Slot USB cradle's technical specifications.

Table A-3 Four-Slot USB Cradle Technical Specifications

Item	Description
Operating Temperature	-32° to 122°F (0° to +50°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Battery Charging Temperature	32° to 104°F (0° to 40°C)
Humidity	5% to 95% non-condensing at 122° F (50°C)
Electrostatic Discharge (ESD)	+/-15 kV (air) (RH 50%); +/- 8 kV (contact)
Drop	30 in. (0.76 m) to vinyl tiled concrete
Shock and Vibration	Drop/Shock: 2 times per side (12 drops total of the same unit) from a height of 30 in. (0.76 m) to concrete at room temperatures. Vibration: 4G's, random, 20 Hz to 2,000 Hz vibration Cargo/Packaged: Six (6) foot drop at 23°C, 5 Hz, Vibration < 20 lbs Vehicle stacking 96", 23°C, and 85% relative humidity
Dimensions	4.0 in. L x 12.5 in. W x 3.00 in. H (102 mm L x 318 mm W x 77 mm H)
Weight	13.05 oz (370 g)
Interface	USB (miniB connector provided)

Mobile Computer Pin-Outs

Table A-4 MC1000 Pin-Outs

PIN Number	Signal Name	Function
1	GND	Ground, 2.5A max.
2	CRADLE_DET	Grounded by cradle when in cradle
3	DCD	RS232C
4	USB_D_MINUS	USB
5	USB_D_PLUS	USB
6	GND	Ground, 2.5A max.
7	USB-VBUS	USB
8	USB-ID	USB
9	TXD	RS232C
10	RXD	RS232C
11	RTS	RS232C
12	CTS	RS232C
13	DTR	RS232C
14	DSR	RS232C
15	VCC_OUT	3.3V@150mA max
16	EXT_PWR	5.4V, 2.5A max.

Appendix B Keypad Maps

Introduction

This appendix contains the keypad map for the MC1000.

Keypad

The keypad contains a **Power** button, application keys, scroll keys, and a function key. See *Table B-5* for the keypad mappings.

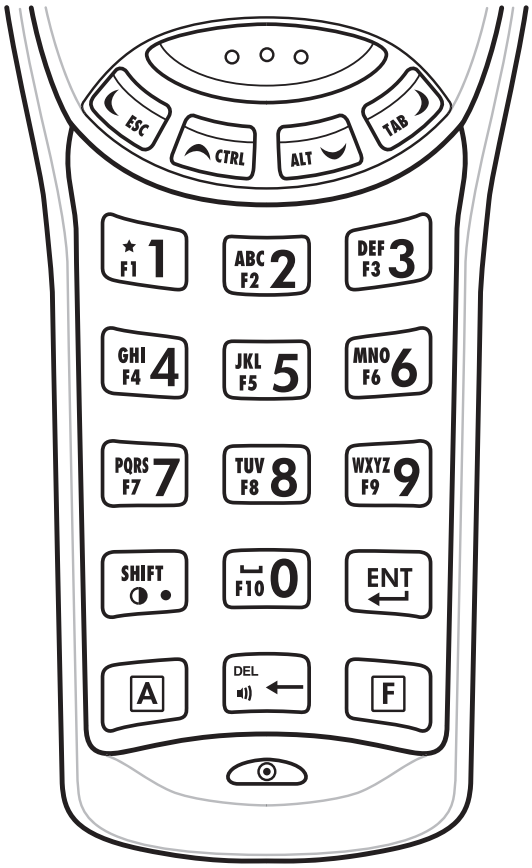


Figure B-1 MC1000 Keypad

Table B-5 Keypad Mapping

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
	Up												38	
											CTRL			
	Left												37	
											ESC			

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
	Right												39	
											TAB			
	Down												40	
											ALT			

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
★ F1 1	1												49	49
		*											106	42
											F1			
												F1		
ABC F2 2	2												50	50
		a											65	97
			b										66	98
				c									67	99
						A							160+65	65
							B						160+66	66
								C					160+67	67
											F2			
												F2		

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
DEF F3 3	3												51	51
		d											68	100
			e										69	101
				f									70	102
						D							160+68	68
							E						160+69	69
								F					160+70	70
											F3			
												F3		
GHI F4 4	4												52	52
		g											71	103
			h										72	104
				i									73	105
						G							160+71	71
							H						160+72	72
								I					160+73	73
											F4			
												F4		

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
JKL F5 5	5												53	53
		j											74	106
			k										75	107
				l									76	108
						J							160+74	74
							K						160+75	75
								L					160+76	76
											F5			
												F5		
MNO F6 6	6												54	54
		m											77	109
			n										78	110
				o									79	111
						M							160+77	77
							N						160+78	78
								O					160+79	79
											F6			
												F6		

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
PQRS F7 7	7												55	55
		p											80	112
			q										81	113
				r									82	114
					s								83	115
						P							160+80	80
							Q						160+81	81
								R					160+82	82
									S				160+83	83
											F7			
												F7		
TUV F8 8	8												56	56
		t											84	116
			u										85	117
				v									86	118
						T							160+84	84
							U						160+85	85
								V					160+86	86
											F8			
												F8		

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
WXYZ F9 9	9												57	57
		w											87	119
			x										88	120
				y									89	121
					z								90	122
						W							160+87	87
							X						160+88	88
								Y					160+89	89
									Z				160+90	90
											F9			
												F9		
F10 0	0												48	48
		SPACE											32	32
											F10			
												F10		

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
	.												190	46
		SHIFT												
											Contrast			
	ENT												13	13

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
	BKSP												8	8
		DEL											46	46
											Volume			
	Alpha													

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Table B-5 Keypad Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Alpha State (1 Tap)-Shift	Alpha State (2 Taps)-Shift	Alpha State (3 Taps)-Shift	Alpha State (4 Taps)-Shift	Ctrl State	Function State	Func State-Shift	VK Code (Decimal)	ASCII Value (Decimal)
	Function													

Note: Blank lines are provided to allow the application developer to use this table as a keypad mapping worksheet.

Appendix C Specifications

Design Considerations

When designing applications for a global environment, refer to the following web site for useful resource information.

- Microsoft Global Development and Computing Portal at http://www.microsoft.com/globaldev.

Glossary

A

API. An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls

Aperture. The opening in an optical system defined by a lens or baffle that establishes the field of view.

Application Programming Interface. See **API**.

ANSI Terminal. A display terminal that follows commands in the ANSI standard terminal language. For example, it uses escape sequences to control the cursor, clear the screen and set colors. Communications programs support the ANSI terminal mode and often default to this terminal emulation for dial-up connections to online services.

ASCII. American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks and control characters. It is a standard data transmission code in the U.S.

Autodiscrimination. The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.

B

Bar. The dark element in a printed bar code symbol.

Bar Code. A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format. See **Symbology**.

Bar Code Density. The number of characters represented per unit of measurement (e.g., characters per inch).

Bar Height. The dimension of a bar measured perpendicular to the bar width.

Bar Width. Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

BIOS. Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

Bit. Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Bits per Second (bps). Bits transmitted or received.

Bit. Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

bps. See **Bits Per Second**.

Byte. On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.

BOOTP. A protocol for remote booting of diskless devices. Assigns an IP address to a machine and may specify a boot file. The client sends a bootp request as a broadcast to the bootp server port (67) and the bootp server responds using the bootp client port (68). The bootp server must have a table of all devices, associated MAC addresses and IP addresses.

boot or boot-up. The process a computer goes through when it starts. During boot-up, the computer can run self-diagnostic tests and configure hardware and software.

C

CDRH. Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CDRH Class 1. This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.

CDRH Class 2. No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.

Character. A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.

Character Set. Those characters available for encoding in a particular bar code symbology.

Check Digit. A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

Codabar. A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- $: / , +).

Code 128. A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39). A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9 and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

Code 93. An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.

Code Length. Number of data characters in a bar code between the start and stop characters, not including those characters.

Cold Boot. A cold boot restarts the mobile computer and erases all user stored records and entries.

COM port. Communication port; ports are identified by number, e.g., COM1, COM2.

Continuous Code. A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.

Cradle. A cradle is used for charging the mobile computer battery and for communicating with a host computer, and provides a storage place for the mobile computer when not in use.

D

Data Communications Equipment (DCE). A device (such as a modem) which is designed to attach directly to a DTE (Data Terminal Equipment) device.

DCE. See **Data Communications Equipment**.

DCP. See **Device Configuration Package**.

Dead Zone. An area within a scanner's field of view, in which specular reflection may prevent a successful decode.

Decode. To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.

Decode Algorithm. A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

Decryption. Decryption is the decoding and unscrambling of received encrypted data. Also see, **Encryption** and **Key**.

Depth of Field. The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Device Configuration Package. The Symbol Device Configuration Package provides the Product Reference Guide (PRG), flash partitions, Terminal Configuration Manager (TCM) and the associated TCM scripts. With this package hex images that represent flash partitions can be created and downloaded to the mobile computer.

Discrete Code. A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

Discrete 2 of 5. A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

DRAM. Dynamic random access memory.

DTE. See **Data Terminal Equipment**.

E

EAN. European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.

Element. Generic term for a bar or space.

Encoded Area. Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.

ENQ (RS-232). ENQ software handshaking is also supported for the data sent to the host.

ESD. Electro-Static Discharge

F

Flash Disk. An additional megabyte of non-volatile memory for storing application and configuration files.

Flash Memory. Flash memory is nonvolatile, semi-permanent storage that can be electronically erased in the circuit and reprogrammed. MC1000 mobile computers use Flash memory to store the operating system (ROM-DOS), the terminal emulators, and the Citrix ICA Client for DOS.

File Transfer Protocol (FTP). A TCP/IP application protocol governing file transfer via network or telephone lines. See **TCP/IP.**

FTP. See **File Transfer Protocol**.

Flash Memory. Flash memory is responsible for storing the system firmware and is non-volatile. If the system power is interrupted the data is not be lost.

H

Hard Reset. See **Cold Boot**.

Hz. Hertz; A unit of frequency equal to one cycle per second.

Host Computer. A computer that serves other mobile computers in a network, providing such services as computation, database access, supervisory programs and network control.

I

IDE. Intelligent drive electronics. Refers to the solid-state hard drive type.

IEC. International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC (825) Class 1. This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

IEEE Address. See **MAC Address**.

Interleaved 2 of 5. A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Intercharacter Gap. The space between two adjacent bar code characters in a discrete code.

Interleaved Bar Code. A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

Interleaved 2 of 5. A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Internet Protocol Address. See **IP**.

I/O Ports. interface The connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings. Types of interfaces include RS-232 and PCMCIA.

Input/Output Ports. I/O ports are primarily dedicated to passing information into or out of the mobile computer’s memory. MC1000 mobile computers include Serial and USB ports.

IP. Internet Protocol. The IP part of the TCP/IP communications protocol. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or subnetwork. IP accepts “packets” from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a “datagram” to the layer 2 data link protocol. It may also break the packet into fragments to support the maximum transmission unit (MTU) of the network.

IP Address. (Internet Protocol address) The address of a computer attached to an IP network. Every client and server station must have a unique IP address. A 32-bit address used by a computer on a IP network. Client workstations have either a permanent address or one that is dynamically assigned to them each session. IP addresses are written as four sets of numbers separated by periods; for example, 204.171.64.2.

IPX/SPX. Internet Package Exchange/Sequential Packet Exchange. A communications protocol for Novell. IPX is Novell’s Layer 3 protocol, similar to XNS and IP, and used in NetWare networks. SPX is Novell's version of the Xerox SPP protocol.

IS-95. Interim Standard 95. The EIA/TIA standard that governs the operation of CDMA cellular service. Versions include IS-95A and IS-95B. See CDMA.

K

Key. A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, **Encryption** and **Decrypting**.

L

laser scanner. A type of bar code reader that uses a beam of laser light.

LASER. Light Amplification by Stimulated Emission of Radiation.The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

Laser Diode. A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

LCD. See **Liquid Crystal Display**.

LED Indicator. A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.

Liquid Crystal Display (LCD). A display that uses liquid crystal sealed between two glass plates. The crystals are excited by precise electrical charges, causing them to reflect light outside according to their bias. They use little electricity and react relatively quickly. They require external light to reflect their information to the user.

Light Emitting Diode. See **LED**.

M

MC. Mobile Computer.

MDN. Mobile Directory Number. The directory listing telephone number that is dialed (generally using POTS) to reach a mobile unit. The MDN is usually associated with a MIN in a cellular telephone -- in the US and Canada, the MDN and MIN are the same value for voice cellular users. International roaming considerations often result in the MDN being different from the MIN.

MIL. 1 mil = 1 thousandth of an inch.

MIN. Mobile Identification Number. The unique account number associated with a cellular device. It is broadcast by the cellular device when accessing the cellular system.

Misread (Misdecode). A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.

Mobile Computer. In this text, mobile computer refers to the MC1000 mobile computer. It can be set up to run as a stand-alone device.

N

Nominal. The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.

Nominal Size. Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).

NVM. Non-Volatile Memory.

O

ODI. See **Open Data-Link Interface**.

Open Data-Link Interface (ODI). Novell's driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.

P

Parameter. A variable that can have different values assigned to it.

Percent Decode. The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.

Print Contrast Signal (PCS). Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.

Programming Mode. The state in which a scanner is configured for parameter values. See **Scanning Mode**.

Q

Quiet Zone. A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

QWERTY. A standard keyboard commonly used on North American and some European PC keyboards. "QWERTY" refers to the arrangement of keys on the left side of the third row of keys.

R

RAM. Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

Reflectance. Amount of light returned from an illuminated surface.

Resolution. The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.

ROM. Read-Only Memory. Data stored in ROM cannot be changed or removed.

RS-232. An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.

S

Scan Area. Area intended to contain a symbol.

Scanner. An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are:

1. Light source (laser or photoelectric cell) - illuminates a bar code.
2. Photodetector - registers the difference in reflected light (more light reflected from spaces).
3. Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.

Scanning Mode. The scanner is energized, programmed and ready to read a bar code.

Scanning Sequence. A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

SDK. Software Development Kit

Self-Checking Code. A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.

SID. System Identification code. An identifier issued by the FCC for each market. It is also broadcast by the cellular carriers to allow cellular devices to distinguish between the home and roaming service.

SMDK. Symbol Mobility Developer's Kit.

Soft Reset. See **Warm Boot**.

Space. The lighter element of a bar code formed by the background between bars.

Specular Reflection. The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.

Start/Stop Character. A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

Subnet Mask. A 32-bit number used to separate the network and host sections of an IP address. A custom subnet mask subdivides an IP network into smaller subsections. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets. Default is often 255.255.255.0.

Substrate. A foundation material on which a substance or image is placed.

SVTP. Symbol Virtual Terminal Program.

Symbol. A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters and check characters.

Symbol Aspect Ratio. The ratio of symbol height to symbol width.

Symbol Height. The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length. Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.

Symbology. The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39, PDF417, etc.).

T

TFTP. (Trivial File Transfer Protocol) A version of the TCP/IP FTP (File Transfer Protocol) protocol that has no directory or password capability. It is the protocol used for upgrading firmware, downloading software and remote booting of diskless devices.

Tolerance. Allowable deviation from the nominal bar or space width.

Transmission Control Protocol/Internet Protocol. See **TCP/IP.**

Trivial File Transfer Protocol. See **TFTP.**

TSR. See **Terminate and Stay Resident**.

U

UPC. Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.

V

Visible Laser Diode (VLD). A solid state device which produces visible laser light.

W

Warm Boot. A warm boot restarts the mobile computer by closing all running programs. All data that is not saved to flash memory is lost.

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Lincolnshire, IL U.S.A
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72E-87638-03 Revision A - April 2015